We do not propose in this notice to epitomize the report; we prefer to do more justice to the subject by presenting from time to time brief abstracts of the paper, some of which are very elaborate, occupying 160 pages of closely printed matter, and 90 illustrations.

That part of the report describing the success of the commission in propagating salmon has been anticipated by the public press, but many of the details now given are new and of great interest. Many persons in the East will be astonished at the large scale of the salmon fishery in the Western rivers, where seven to nine thousand fish are sometimes taken in one day. From one station (the St. Cloud river), fourteen millions of eggs of salmon were secured and embryonized —sufficient to keep up the supply being returned to the river, the remainder were sent East; 7,250,000 arrived in Chicago between the 3rd and 7th of October. The report states that, after supplying the home demand, 500,000 were presented to Canada, 100,000 to England, 100,000 to France, 100,000 to Holland, 250,000 to Germany and 200,000 to New Zealand.

In regard to shipments to the last named country, it is satisfactory to be able to state, that they not only arrived in perfect condition, but that by the latest advices the young fish were seen in every direction, promising to be the ancestors of a numerous progeny.

Reference is made to Professor W. O. Atwater's investigations upon the food qualities of various species of fishes, the chief facts relating to which we were able to present in an abstracted form, to the readers of "SCIENCE," a few weeks since.

Various attempts have been made to introduce live specimens of the English Sole, one of the most delicious and prolific of British fishes. The last attempt by Mr. Fred. Mather, whose skill in fish culture is acknowledged in the report, was unfortunately like the rest—a failure. Mr. Mather gives a very reasonable explanation of his want of success, and it must be admitted that he was not supplied with the necessary conveniences. During 1880, Captain Mortimer was more successful, and succeeded in placing living specimens of the Sole (*Solea vulgaris*) in New York harbor. Captain Mortimer explained to us that his apparatus consisted of a tank having a fixed cover, to which were attached two globes, the constant rolling of the vessel causing the water of the tank to pass to the globes and return, thus keeping up a constant aeration for the fish, which naturally remained at the bottom.

We reluctantly close our notice of this most valuable and interesting Report feeling that our task has been but half fulfilled. We shall, however, again take up the subject in greater detail, and present our readers with many facts of much scientific interest.

THE AMERICAN CHEMICAL SOCIETY.*

The January meeting of the above Society was held in their rooms, Monday evening, January 3, 1881, Prof. C. F. Chandler in the President's chair. The nominations of Messrs. James F. Slade, Theodore M. Hopke, A. F. Hoppick as regular, and of Mr. E. K. Dunham as associate members were made. The resignations of Prof. Ira Remsen, Prof. S. P. Sadtler and Mr. L. W. Drew, read and accepted. A motion for the reduction of the annual dues from $10 to $5 was favorably considered, and the day of meeting was changed from Thursday to Monday, so that in the future, meetings will be held on the first and third Mondays of each month, instead of on the corresponding Thursdays. There being no papers before the society, the meeting was adjourned. We add herewith a list of the officers chosen at the December meeting for the present year: President, Prof. C. F. Chandler; Vice-Presidents, A. R. Leeds, G. A. Koenig, E. R. Squibb, Charles A. Goessmann, Henry Morten, Ira Remsen; Corresponding Secretary, P. Casamajor; Recording Secretary, Albert H. Gallatin; Treasurer, W. H. Nichols; Librarian, E. Waller; Curators, W. Rupp, A. J. Rossi, A. A. Fesquet.

ON A THERMO-MAGNETIC THERMOSCOPE.

BY SIR WILLIAM THOMSON.

This thermoscope is founded on the change produced in the magnetic moment of a steel magnet by change of temperature. Several different forms suggest themselves. The one which seems best adapted to give good results is to be made as follows:

1. Prepare an approximately astatic system of two thin hardened steel wires, $r\ b, r^1\ b^1$, each one centimetre long, one of them, $r\ b$, hung by a single silk fibre, and the other hung bifilarly from it by fibres about three centimetres long, so attached that the projections of the two on a horizontal plane shall be inclined at an angle of about .01 of a radian (or .57°) to one another.

2. Hang a very small, light mirror, bifilarly from the lower of the two wires.

3. Magnetize the two wires to very exactly equal magnetic moments in the dissimilar directions. This is easily done by a few successive trials, to make them rest as nearly as possible perpendicular to the magnetic meridian.

4. Take two pieces of equal and similar straight steel wire, well hardened, each two centimetres long, and about .04 centimetres diameter. Magnetize them equally and similarly, and mount them on a suitable frame to fulfil conditions.

5 and 6. Call them R B and R^1 B^1, B and B^1 denoting the ends containing true north polarity (ordinarily marked B), and R R^1 true south (ordinarily marked red). The small letters, r, b, r^1, b^1, mark on the same plan the polarites of $r\ b$ and $r^1\ b^1$.

3. The magnets R B, R^1 B^1, are to be relatively fixed in line on their frame with similar poles next one another, at a distance of about two centimetres asunder, as thus, R B . . . B^1 R^1, with B B^1 = two centimetres.

6. This frame is to be mounted on a geometrical slide upon the case, within which the astatic pair, $r\ b, r^1\ b^1$, is hung in such a manner that the line of R B, B R bisects $r\ b$, approximately at right angles, and that R B B R may be moved by a micrometer screw through about a millimetre on each side of its central position, the line of motion being the line of R B, B^1 R^1, and the "central position" being that in which B and B^1 are equi-distant from the centre of $r\ b$.

7. A lamp and scale, with proper focussing lens if the mirror is not concave, are applied to show and measure small deflections as in my mirror galvanometres and electrometer.

* Communicated by M. Benjamin, Ph. B.

8. Place the instrument with the needles approximately perpendicular to the magnetic meridian, turning it so as to bring b and b^1 to the south of the vertical plane bisecting the small angle between the projections of r b, r^1 b^1 and r, and r^1 to the north side of it.

9. By aid of the micrometer screw bring the luminous image to its middle position on the scale.

10. Cause R B, B^1 R^1 to have different temperatures. The luminous image is seen to move in such a direction as is due to r approaching the cooler, and receding from the warmer of the two deflectors B R, B^1 R^1.—*Proceedings Royal Society, Edinburgh.*

[*Continued from page 270.*]

THE UNITY OF NATURE.

BY THE DUKE OF ARGYLL.

IV.

ON THE LIMITS OF HUMAN KNOWLEDGE CONSIDERED WITH REFERENCE TO THE UNITY OF NATURE.

And yet, although it is to Nature in this highest and widest sense that we belong—although it is out of this fountain that we have come, and it is out of its fullness that we have received all that we have and are, men have doubted, and will doubt again, whether we can be sure of anything concerning it.

If this terrible misgiving had affected individual minds alone in moments of weariness and despair, there would have been little to say about it. Such moments may come to all of us, and the distrust which they leave behind them may be the sorest of human trials. It is no unusual result of abortive yet natural effort and of innate yet baffled curiosity. But this doubt, which is really nothing more than a morbid effect of weakness and fatigue, has been embraced as a doctrine and systematized into a philosophy. Nor can it be denied that there are some partial aspects of our knowledge in which its very elements seem to dissolve and disappear under the power of self-analysis, so that the sum of it is reduced to little more than a consciousness of ignorance. All that we know of Matter is so different from all that we are conscious of in Mind, that the relations between the two are really incomprehensible and inconceivable to us. Hence this relation constitutes a region of darkness in which it is easy to lose ourselves in an abyss of utter skepticism. What proof have we—it has been often asked—that the mental impressions we derive from objects are in any way like the truth? We know only the phenomena, not the reality of things. We are conversant with things as they appear, not with things as they are "in themselves." What proof have we that these phenomena give us any real knowledge of the truth? How, indeed, is it possible that knowledge so "relative" and so "conditioned"—relative to a mind so limited, and conditioned by senses which tell us of nothing but sensations—how can such knowledge be accepted as substantial? Is it not plain that our conceptions of Creation and of a Creator are all mere "anthropomorphism?" Is it not our own shadow that we are always chasing? Is it not a mere bigger image of ourselves to which we are always bowing down?

It is upon suggestions such as these that the Agnostic philosophy, or the philosophy of Nescience, is founded—the doctrine that, concerning all the highest problems which it both interests and concerns us most to know, we never can have any knowledge or any rational and assured belief.

It may be well to come to the consideration of this doctrine along those avenues of approach which start from the conception we have now gained of the unity of Nature.

Nothing, certainly, in the human mind is more wonderful than this—that it is conscious of its own limitations. Such consciousness would be impossible if these limitations were in their nature absolute. The bars which we feel so much, and against which we so often beat in vain, are bars which could not be felt at all unless there were something in us which seeks a wider scope. It is as if these bars were a limit of opportunity rather than a boundary of power. No absolute limitation of mental faculty ever is, or ever could be, felt by the creatures whom it affects. Of this we have abundant evidence in the lower animals, and in those lower faculties of our own nature which are of like kind to theirs. All their powers and many of our own are exerted without any sense of limitation, and this because of the very fact that the limitation of them is absolute and complete. In their own nature they admit of no larger use. The field of effort and of attainable enjoyment is, as regards them, co-extensive with the whole field in view. Nothing is seen or felt by them which may not be possessed. In such possession all exertion ends and all desire is satisfied. This is the law of every faculty subject to a limit which is absolute. In physics, the existence of any pressure is the index of a potential energy which, though it may be doing no work, is yet always capable of doing it. And so in the intellectual world, the sense of pressure and confinement is the index of powers which under other conditions are capable of doing what they cannot do at present. It is in these conditions that the barrier consists, and at least to a large extent they are external. What we feel, in short, is less an incapacity than a restraint.

So much undoubtedly is to be said as to the nature of those limitations on our mental powers of which we are conscious. And the considerations thus presented to us are of immense importance in qualifying the conclusions to be drawn from the facts of consciousness. They do not justify, although they may account for, any feeling of despair as to the ultimate accessibility of that knowledge which we so much desire. On the contrary, they suggest the idea that there is within us a Reserve of Power to some unknown and indefinite extent. It is as if we could understand indefinitely more than we can discover, if only some higher Intelligence would explain it to us.

But if it is of importance to take note of this Reserve of Power of which we are conscious in ourselves, it is at least of equal importance to estimate aright the conceptions to which we can and do attain without drawing upon this reserve at all. Not only are the bars confining us bars which we can conceive removed, but they are bars which in certain directions offer no impediment at all to a boundless range of vision. Perhaps there is no subject on which the fallacies of philosophic phraseology have led to greater errors. "That the Finite cannot comprehend the Infinite," is a proposition constantly propounded as an undoubted and all-comprehensive truth. Such truth as does belong to it seems to come from the domain of Physics, in which it represents the axiom that a part cannot be equal to the whole. From this, in the domain of Mind, it comes to represent the truth, equally undeniable, that we cannot know all that Infinity contains. But the meaning into which it is liable to pass when applied to Mind is that Man cannot conceive Infinity. And never was any proposition so commonly accepted which, in this sense, is so absolutely devoid of all foundation. Not only is Infinity conceivable by us, but it is inseparable from conceptions which are of all others the most familiar. Both the great conceptions of Space and Time are, in their very nature, infinite. We cannot conceive of either of these as subject to limitation. We cannot conceive of a moment after which there shall be no more Time, nor of a boundary beyond which there is no more Space. This means that we cannot but think of Space as infinite, and of Time as everlasting.

If these two conceptions stood alone they would be enough, for in regard to them the only incapacity under which we labor is the incapacity to conceive the Finite. For all the divisions of Space and Time with which we are so familar,—our days and months and years, and our various units of distance,—we can only think of as bits and fragments of a whole which is illimitable. But although these great conceptions of Space and Time are possibly the only conceptions to which the idea of infinity attaches as an absolute necessity of Thought, they are by no means the only conceptions to which the same idea can be attached, and probably ought to be so. The conception of Matter is one, and the conception of Force is another, to which we do not perhaps attach, as of necessity, the idea of indestructibility, or the idea of eternal existence and of infinite extension. But it is remarkable that in exact proportion as science advances, we are coming to understand that both of