SCIENCE.

FRIDAY, MARCH 27, 1885.

COMMENT AND CRITICISM.

If our confidence in posterity be not misplaced, it will look with peculiar interest upon the hobby-horses of our day, particularly those used by some persons, with many external claims to consideration, in their raids upon physiologists and their work. One of these animals has recently been ridden in an attack upon a deceptive figure which was labelled with the name of Professor Martin of Johns Hopkins university. The arena as well as the figure, which, of course, was demolished, was furnished by the *Zoophilist*, falsely so called, — a journal supported by some antivivisection societies in England. But the real Professor Martin has come upon the scene with a little pamphlet, which is not only a 'correction,' but a severe 'castigation' and an 'appeal,' as its sub-title tells us.

During some nine years, Dr. Martin has been the esteemed head of the department of biology in Johns Hopkins university. Both by him, and by enthusiastic pupils working under his direction, many interesting researches have been undertaken, and some very important results have been obtained. One of the most valuable 'finds' is an admirable method for the study of the mammalian heart, isolated from all the influences of the body. This method involves the killing of the entire animal, except the heart and the lungs, which are needed for the artificial aeration of the blood. With the exception of the brief period required for administration of the narcotic or anaesthetic, the entire procedure is painless. The only possible exception is found in two instances where curare was used to exclude and control the action of the narcotics usually employed; and here the period of possible pain is very brief, lasting only until the blood-supply to the brain can be cut off. These experiments are not merely of the greatest theoretical interest, but their practical importance is immense and far-reaching. Already it has been possible to determine that fever temperatures of the blood are alone sufficient to act powerfully upon the heart, and alter its work. The hope which this form of study holds out, not only of increasing our understanding of the heart's action, but also of giving us much exacter knowledge of the action of drugs upon that organ, and the great value of such knowledge, must be evident to every candid person.

The Baltimore investigations have all been published in detail: no secret has been made of the method, and the work has had all the publicity which the ordinary channels open to such communications permit. The *Zoophilist* people met with one of the reports in the *Philosophical transactions* of the Royal society, and proceeded to give a garbled version, with comments, according to the method familiar to all who have read any of the peculiar writings of the antivivisectionists. This was well spiced with allusions to the barbarity permitted in 'far-off' America, and to the callousness of Dr. Martin, with 'his learned jargon and supposed results.' The reply will be found to be an honest and vigorous protest, which will have the hearty approval of every right-minded and clear-headed man. It not only gives a plain statement of the maliciousness and injustice and ignorance of his accusers, whose lies he numbers as he nails them, but it also contains a manly appeal to those among whom he has worked and taught, to stand by him, to protect him and others from this form of abusive misrepresentation; and he appeals, furthermore, to the officers and committee of the society, whose mouthpiece the *Zoophilist* is said to be. The list contains many names of those in good repute and in high places (there are not only ecclesiastical and courtly dignitaries among them, but, *mirabile dictu*, scientific worthies as

well); and Dr. Martin's plain declaration of the character of the work they support ought to call a blush of shame to the cheek of every one of them, unless, indeed, the disease may have already affected the vaso-motor centre.

The report of the commissioners of the Massachusetts state topographical survey for 1884 shows that the system of co-operative work with the U. S. geological survey has proved entirely successful. The work has been under the immediate control of the U. S. geological survey, but subject to the inspection of the state commissioners at every stage. Although the field-operation did not begin until midsummer, and was subject to all the difficulties of starting, an area of several hundred miles for detailed contoured maps was surveyed before the winter closed the field-work. The parties, few in number, were so placed that their work fairly represents all the varieties of topography within the state; and the results give a fair measure of the cost of a completed map on the scale of two inches to the mile, with contours at intervals of twenty feet. It appears that this cost is not likely to exceed fifteen dollars per square mile, and may be brought within twelve dollars.

The report recommends a further appropriation of three thousand dollars per annum, to be used in the determination by triangulation of the corners of the several town areas. The present system of delimiting the towns and preserving the memory of their bounds is an inheritance from former ages. It is said that in the old English days the memory of the boundaries was effectively maintained by taking all the boys of the town to the bounds, and soundly flogging them along the lines. By repeating this from year to year, the male population of the township was sure to have a lively, though perhaps unpleasant, sense of these limits. This simple method of fixing the boundaries has fallen into disuse, but as yet no more effective modern system has taken its place.

The commissioners of the Pennsylvania geological survey have stipulated with Major Powell to prosecute the survey of that state on terms similar to those arranged with Massachusetts. The plan requires an appropriation of ten thousand dollars per annum on the part of the state. If this plan is carried out, — and it is hardly conceivable that the Pennsylvania legislature will not do its part of the work, — the map of that state should be completed within ten years.

One of the greatest hinderances to the development of the United States arises from the imperfect knowledge of its surface and structure. Our modern life cleaves so closely to the earth, that at every step we need a vast amount of accurate information which our forefathers did not require. If the admirable plans of the present director of the geological survey are allowed to bear their point, by the end of this century, this hinderance may be removed; the whole surface of the national area will be mapped on a scale proportionate to the needs; and the cost of the work will not much, if at all, exceed that of maintaining a regiment of cavalry for the same time. There will be reason for sad comments on the American reputation for sagacity, if this work is not done.

Any one who has seen the results of the terrible upheaval at the south caused by the war is surprised when here and there he sees signs of returning prosperity. Knowing to how many a southerner, as he sits on his well-worn mahogany and gazes at his streaked mirror, it is the question of each day where he may obtain the meagre ration of hominy for himself he was wont to mete out to his slaves, it is actually a cause of wonder, when one hears now and then of the prosperity of some of the southern colleges, and at last of the revival of an interest in science, such as is shown by the formation of the Elisha Mitchell scientific society in North Carolina.

This society was the outgrowth of the small knot of studious men about the college at

Chapel Hill, and completed its first year of existence last autumn. In its first report it is stated to have seven life-members, seventy-five regular members, and seventy-four associates. Monthly meetings have been held in which the interest taken was encouraging. The papers published in the first numbers of the yearly report of the society are of good character, and receive much of their inspiration from the chemical laboratory of the University of North Carolina. A biographical sketch and portrait of Mitchell are prefixed.

LETTERS TO THE EDITOR.

Mr. Melville's plan of reaching the north pole.

IN the issue of the New-York *Evening post*, Feb. 6, I opposed Mr. Melville's plan of reaching the north pole,[1] as I could not consider the theory on which it is founded correct. In answer to my remarks, Mr. Melville in the same paper, Feb. 17, maintains his position, and denounces his critics for hindering his endeavors, instead of "sending him to prove his theories he has so much faith in, and permitting him to bring back the necessary facts that alone can carry conviction to the unbeliever without a theory." He says, "It would be more in the spirit of progress and the advancement of science, if my critics would propound new theories or other plans of progress, rather than simply find fault or say, '*I don't believe.*'" We cannot coincide with this opinion of Mr. Melville, and claim the full right to criticise a plan of exploration before it is set in motion. What is the cause of so many failures of arctic expeditions and other undertakings? Is it the careless neglect of thorough deliberation before entering into expeditions, or is it the hostility of nature? Have we nothing to learn by the Jeannette and the Proteus? If we should claim at any time the right of criticism, we do it now, when the blunders and misfortunes which effected the failures of the last expeditions are deeply impressed on public minds, and nearly extinguish the little interest which is left for scientific work in the Arctic. We consider it in the spirit of progress of science, to prove the fallacy of a plan founded on theories like those of Mr. Melville, which cannot be accepted by scientific men, and must lead to disaster, or will at least be unsuccessful.

It is somewhat difficult to understand Mr. Melville's theory; and I do not know that I am able to give an explanation of it which will satisfy the author. Mr. Melville supposes that the Arctic Ocean, north of 85° north latitude, is covered by a solid ice-cap kept in a state of equilibrium by the centrifugal force. He intends to start from the northern limit of Franz Josef Land on sledges, travelling over the smooth ice-cap towards the north pole, — a supposed distance of five degrees; i.e., three hundred miles out and three hundred miles back. In returning he intends to use the southern drift of the ice, which will carry him either back to Franz Josef Land or to Spitzbergen, where he would have depots erected for the use of the retiring party.

[1] G. W. Melville, In the Lena delta. Boston, 1885.

His view about the ice-cap will be seen from the following quotations (*l. c.*, p. 475): "After crossing the eighty-fifth degree of latitude, the traveller will come to that immovable ice-cap which will in all probability prove to be a palaeocrystic sea of ice and snow. We should have a clear, unbroken surface to travel upon, subject, of course, to fissures and shrinkage cracks." P. 476, he says, "The countless million square miles of ice annually expelled from the Arctic Ocean alone prove the fallacy of a 'palaeocrystic sea of ice;'" p. 478, "Let the state of the ice be as it may, it certainly can be no worse than the broken path over which the Jeannette's crew marched."

From these quotations, it would appear that Mr. Melville is not very certain of the existence of the ice-cap. The assertion, however (p. 479), that "the feat of marching to the pole and back will be easily practicable," and the fact that his plan is founded on this theory, prove Mr. Melville's confidence in it. If it can be proved that Mr. Melville's reasons for the existence of an ice-cap cannot be maintained, if it can be proved that an ice-cap cannot exist, his plan must needs fall to pieces. Let us enter into his proofs singly.

First: "As the centrifugal influence is acting equally in all directions, and tending to pull the ice-cap towards the equator, it can only carry away those detailed portions of ice broken near the outskirts of the ice-cap" (p. 474). No doubt, the centrifugal pull at a certain parallel will be equal on every meridian; but, supposing this continuous ice-cap to exist, an equal pull could only come to pass if it extended to the same parallel all around the pole. Every mile added to one side would increase the pull there, and disturb the equilibrium which Mr. Melville requires for his theory. Besides, we cannot imagine any kind of ice strong enough to stand the immense tension effected by the centrifugal force on a solid body of three hundred miles in radius. An approximate computation of the effects of the centrifugal force on a body of ice of three metres' thickness, extending from latitude 85° to 86°, gives a tension of nearly thirty kilograms on one square centimetre.

As soon as Mr. Melville will grant us the slightest motion of his ice-cap in any direction, he has to give up his theory, as the "nucleus of pointed island peaks, which, if nothing more, will hold the ice fast at the pole" (p. 474), will not any longer hold the cap, but break it up into an immense pack. I suppose Mr. Melville will concede that his arguments referring to an equal pull by the centrifugal force cannot be maintained.

The hydrographical and meteorological theories which he brings forth in favor of his plan cannot be supported from the present state of our knowledge in these sciences.

He supposes that there are two currents, — an equatorial, setting north; a polar, setting south, — and between both a neutral zone which he supposes at about 85° north latitude, where scarcely any current exists. Considering the observations on currents in the polar seas, we cannot understand how Mr. Melville can propound such a theory. This is not the place to treat of modern oceanography; and I can only refer to Thomson's and Carpenter's works, and to Zöppritz's mathematical theory of currents, which give a basis to this science not allowing us to form theories like Mr. Melville's. We may only be permitted to say a few words about the improbability of symmetrical currents such as Mr. Melville supposes. The Arctic Ocean forms a large Mediterranean Sea, with one wide outlet between Greenland and Norway. The exchange of water between the Arctic and the