

atmosphere from other causes, must always present great difficulty in the way of ascertaining the truth—and had, in fact, till Colonel Sabine's researches, prevented any decisive testimony of the fact being obtained by direct observation. But the hourly observations of the barometer made for some years past at the Meteorological and Magnetical Observatory at Saint Helena have now placed beyond a doubt the existence of a lunar atmospheric tide. It appears that in each day the barometer at Saint Helena stands, on an average, four thousandths of an inch higher at the two periods when the moon is on the meridian above or below the pole than when she is six hours distant from the meridian on either side; the progression between this maximum and minimum being moreover continuous and uninterrupted:—thus furnishing a new element in the attainment of physical truth; and, to quote the expression of a distinguished foreigner now present, which he uttered in my own house when the subject was mentioned, "We are thus making astronomical observations with the barometer"—that is, we are reasoning from the position of the mercury in a barometer, which we can touch, as to the position of the heavenly bodies which unseen by us, are influencing its visible fall and rise. "It is no exaggeration to say,"—and here I use the words of my friend, the Rev. Dr. Robinson,—“that we could even, if our satellite were incapable of reflecting light, have determined its existence, nay, more, have approximated to its eccentricity and period.”

I am unwilling to quit this subject without expressing my deep sense of the services rendered to science by the patient, laborious, unobtrusive observations and researches of my eminent friend, Colonel Sabine, in meteorology, and above all magnetism, in connection with different and very distant points of the earth: researches undertaken, some of them, before public attention was so generally called to the subject as it has been in later years—(since the British Association urged the importance of such investigation upon the government at home; and undertaken at great sacrifice of domestic comfort, and at a risk of life, not in the ordinary duties of his noble profession, but in the pursuit of science for its own sake,—science one year at the North Pole, and the next, I think, in Sierra Leone. The reputation thus acquired does not come quickly, but it comes surely, and will survive permanently; and the reputation of the individual adds to the reputation of his country.

I hardly know why, on this division of my subject more than on any other, I should recall to the notice of the meeting the Address of that master mind, Dr. Robinson, of Armagh, to the Monaghan Society; an address delivered to a provincial body in Ireland, which ought to be spread over the whole empire:—but as I read it with the deepest interest, as it is far too little known, and as I owe much to Dr. Robinson for the assistance which he has now intrusted to me, I am unwilling to omit this tribute of respect and gratitude.

In concluding this sketch of the progress and state of Astronomy, pardon me if I here quote a passage, which has been a favorite with me for thirty years, and which I always desire to apply, first as a lesson to myself—and perhaps, though with great deference, as a lesson to others also. It is taken from a great master of the English language, in the best age of English literature, Henry Peacham.—He is referring, in substance, to the parallax of the fixed stars, and his illustration is to this effect:—If from two points of the earth's surface the same star appears of the same bigness, how great must be that star—how inconsiderable, the Earth! His conclusion is strengthened by discoveries unknown in his age: and I may extend his truth and supply the figures which make it more striking. If at two extremities of the Earth's orbit (between which extremities not less than 180,000,000 of miles intervene) there is no parallax, or the smallest measurable, between the position of a star seen from one extremity and the position of the same star seen from the other extremity, in reference to one other star or to all other stars, how infinitely great must be the distance and the size of the stars—how inconsiderable, the Earth! But Peacham's application of the truth known in his own days I give in his own words:

“If the earth were of any quantitie in respect of the higher orbis, the starres should seeme bigger or lesse in regard of those *hypsomata* (altitudes,) or the climes; but it is certaine that at the selfsame time sundrie astronomers finde the same bignesse and elevation of the selfsame starre observed by their calculation to differ no whit at all; whereby we may see, if that distance of place which is on the earth (in respect of the heavenly orbis) exceedeth all sence, it followes that the earth (poore little point as it is) seemes the like, if it be compared with heaven: yet this is that point which, with fire and sword, is divided among so many nations, the matter of our glorie, our seate; heere we have our honours, our armies, our commands; heere we heape up riches at perpetual warre and strife among ourselves, who, (like the toad) shal fall asleepe with most earth in his pawes; never thinking how of a moment of time well spent upon this poore plot or dung-hill, common to beasts as well as ourselves, dependeth eternitie, and the fruition of our true happinesse in the presence of heaven, and court of the King of Kings for ever and ever.”

The extensive and diversified field of Physiology presents so many objects of nearly equal interest, as to make it difficult, in a rapid sketch like the present,—and above all for one like me,—to select those which may least unworthily occupy the attention of the Association.

In Physiology, the most remarkable of the discoveries, or rather improvements of previous discoveries, which the past year has seen, is, perhaps, that connected with the labours of the distinguished Tuscan philosopher, Matteucci; who on several former occa-

sions has co-operated with this Association in the sections devoted to the advancement of the physical and physiological sciences. I refer in this instance to his experiments on the generation of electric currents by muscular contraction in the living body. This subject he has continued to pursue; and by the happy combination of the rigorous methods of physical experiment with the ordinary course of physiological research. Professor Matteucci has fully established the important fact of the existence of an electrical current—feeble, indeed, and such as could only be made manifest by his own delicate galvanoscope—between the deep and the superficial parts of a muscle. Such electric currents pervade every muscle in every species of animal which has been the subject of experiment; and may, therefore, be inferred to be a general phenomenon of living bodies. Even after life has been extinguished by violence, these currents continue for a short time; but they cease more speedily in the muscles of the warm-blooded than in those of the cold-blooded animals. The Association will find his own exposition of the physiological action of the electric current in his work '*Lecons sur les Phénomènes Physiques des Corps Vivants*,' 1847.

The delicate experiments of Matteucci on the Torpedo, agree with those made by our own Faraday (whom I may call doubly our own in this place, where he is a Doctor of our University) upon the *Gymnotus electricus*, in proving that the shocks communicated by those fishes are due to electric currents generated by peculiar electric organs, which owe their most immediate and powerful stimulus to the action of the nerves.—In both species of fishes the electricity generated by the action of their peculiar organized batteries—besides its benumbing and stunning effects on living animals,—renders the needle magnetic, decomposes chemical compounds, emits the spark, and, in short, exercises all the other known powers of the ordinary electricity developed in inorganic matter, or by the artificial apparatus of the laboratory.

Etherization, a kindred subject,—one to which deep and natural importance is now attached,—may not unfitly follow the mention of Professor Matteucci's investigations.

It is the subject of the influence of the vapour of ether on the human frame—a discovery of the last year, and one, the value of which in diminishing human pain, has been experienced in countless instances, in every variety of disease, and especially during the performance of trying and often agonizing operations. Several experiments on the tracts and nerve roots appropriated respectively to the functions of sensation and volition have been resumed and repeated in connexion with this new agency on the nervous system. Messrs. Flourens and Longet have shown that the sensational functions are first affected, and are completely, though temporarily, suspended under the operation of the vapour of ether; then the mental or cerebral powers; and finally, the motor and excito-motor forces are abrogated. It would seem that the stimulus of ether applied so largely or continuously as to produce that effect is full of danger—and that weak constitutions are sometimes unable to rally and recover from it; but that when the influence is allowed to extend no further than to the suspension of sensation, the recovery is as a general rule complete. It is this remarkably property of ether which has led to its recent application with such success as may well lead us to thank God, who, in His Providence, has directed the eminent physicians and surgeons amongst our brethren in the United States to make this discovery;—a discovery which will long place the name of Dr. Charles J. Jackson, its author, among the benefactors of our common nature.

At the same time, much careful observation on the *modus operandi* of this most singular agent, seems still requisite before a general, systematic, safe, and successful application of it can be established for the relief of suffering humanity. So great, however, is the number of well-recorded instances of its having saved the patient from the pain of a surgical operation without any ill effect in reference to his subsequent recovery, as to make the subject of the influence of the vapour of ether upon the nervous system, and the modification of that influence on different temperaments, one eminently deserving the attention of the Physiological Section of the British Association.

With regard to the functions of the primary division and parts of the brain itself, there has been of late a happy tendency to substitute observations on the modifications of those parts in the series of the lower animals in the place of experimental mutilations on a single species, in reference to the advancement of cerebral physiology. Experiment is, no doubt, in some instances, indispensable: but we ought ever to rejoice when the same end is attained by comparative anatomy rather than by experimental vivisections; and every true philosopher will concur with my eminent friend, Professor Owen, in his doubt, (I quote his own words) “whether nature ever answers so truly when put to the torture as she does when speaking voluntarily through her own experiments, if we may so call the ablation and addition of parts which comparative anatomy offers to our contemplation.”—[Owen's Hunterian Lecture, *Vertebrata*, p. 187.]

I was always struck with that passage in the '*Life of Sir W. Jones*,' in which that great man, who united so many claims to the admiration of mankind, declined to accept the offer of a friend to collect, and in collecting to put to death, a number of insects in the Eastern Islands, to be transmitted to Calcutta. He did not, of course, deny the value and importance, and, in one sense, the necessity of forming such collections: but he limited the right of possessing them to those who could use them; and he would not have one of these, the wonders of God's animal world, put to death for the mere gratification of his own unscientific curiosity. He quotes the lines of Ferdusi, for which Saadi invokes a blessing on