

SCIENCE :

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JOHN MICHELS, Editor.

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THE NEW COMET.

The great comet which has so suddenly flashed into our Northern sky is one of the most brilliant comets that has appeared for many years. It has a large and very stellar like nucleus which is surrounded with envelopes, very much like those of the Donati comet of 1858, which was described so well by Professor George P. Bond of the Harvard College Observatory. The dense nuclei of such comets give one the idea of a mass and quantity of matter quite different from the ordinary telescopic comets, through which the faintest stars can be seen. The tail of the present comet is now about twelve or fifteen degrees in length, and altogether this comet presents a very beautiful spectacle at three o'clock in the northeastern morning sky. The motion of the comet is three or four degrees toward the north, and it will soon reach a position where it will be visible during the entire night in the greater part of the United States.

The first duty of the astronomers will be of course to get observations of its positions and to compute the orbit of the comet. Since for this purpose observations on three days are sufficient, we shall soon have a certain knowledge of its motion. The knowledge of the orbit will decide the question whether this is the large comet whose discovery was telegraphed to Europe from Buenos Ayres by Dr. B. A. Gould, on June. 1st, and also whether it is identical with the great comet of 1807. The observations of the comet of 1807 were discussed in a very complete manner by Bessel who found its periodic time to be between 1400 and 1900 years, and it will be a curious fact if the true period proves to be only seventy four years.

This great comet also presents a good opportunity for the spectroscopists to examine its chemical nature, and a rare occasion for the study of the physical constitution of comets. No doubt these questions will

be well attended to by the astronomers and students of our country.

The question of the formation of a comet's tail, and how the particles of matter are driven out from the nucleus in the direction opposite the sun has not yet been answered in a satisfactory manner, and all the facts that can be gathered from observations of this comet will be extremely valuable. In his discussion of the physical constitution of Halley's comet in its appearance of 1835 Bessel found that a repulsive force from the sun was very decidedly shown by the observations of the tail. Similar results were reached by Professor Pierce of Harvard College, Professor Norton of Yale College and by Dr. Pope in their discussion of the Donati comet of 1858. This is an interesting question and it may have an intimate relation with the theory of a resisting medium in space which has been indicated by the motion of Encke's comet.

We learn that unfortunately the weather at Washington has been unfavorable for several days past; but from the numerous good telescopes scattered over the country, we doubt not that good observations of this interesting comet will be gathered.

THE ADDRESS OF THE PRESIDENT OF THE ROYAL MICROSCOPICAL SOCIETY.

LIONEL S. BEALE, F. R. S.

(Concluded from page 297.)

One may transport oneself in imagination into infinite space, amid the never-ceasing vibrations visible and invisible—"The lucid interspace of world and world, where never creeps a cloud, or moves a wind," and may perhaps all but see combined in one mental image, as they ever course through space, suns and worlds and systems. And although at first the mind is almost lost in the contemplation of the infinite physical vastness presented it, it is nevertheless able to seize in some degree a more than shadowy conception of the exactness and regularity of the eternal movements, and to recognize the never-ceasing operation in the material universe of inflexible, unchanging law.

But he who in imagination can succeed in mentally placing himself amid the atoms in the interatomic spaces of a living particle, will be in the very heart as it were of an infinity of a very different order—infinite movement and change affecting infinitely minute particles, so very near to one another that the matter of one may as it were run into that of the other, and the masses divide and subdivide again. Of all this movement and change of particles how very little of what occurs in a portion of matter not more than the one hundred-thousandth of an inch in diameter can be comprised in one mental image? But beyond all this there is the power of prospective change, acting through years it may be, which is somehow associated with the minute particles of living matter, as well as many complex phenomena of which the mind cannot take cognizance as a whole, but must consider, as it were, one by one in several successive pictures.

Could we peer into the very substance of the living particle itself as it was increasing in size and communicating to non-living matter its wonderful properties, what should we see? What is it that happens at the moment when a little complex organic matter dissolved

in water passes from the non-living to the living state? Should we see atoms being arranged and entering into new combinations according to some physical properties inherent in the very matter—atoms combining according to their chemical affinities; or should we see the complex chemical compounds of the pabulum being changed, their elements being somehow torn asunder from their combinations, or rather quietly separating from one another in obedience to some force or power of which we cannot form any accurate conception? The most extraordinary active atomic movements must be taking place, and in the quietest possible manner. Certainly the phenomena which accompany ordinary chemical decompositions in non-living matter do not occur. No two things in this world can be more dissimilar than man's chemical laboratory and nature's laboratory in this living matter. That the formation of the germ is to be accounted for by the operation of the ordinary forces of matter is one of the most absurd of absurd propositions; but that the idea of such an origin should still be entertained and taught by a physicist or chemist is unaccountable.

There are no actions in non-living matter with which the actions of living matter can with any degree of fairness or accuracy be compared. No argument in essential particulars can be pointed out which would justify the use of the word "analogy" without doing violence to truth and cheating the reason. To maintain the identity of the vital and inorganic forces on the ground of some fancied analogy between vital action and crystallization is most wrong and willfully misleading, for the fallacy has been many times exposed and exploded. Been a crystal and living matter there is not the slightest analogy, for the one can be destroyed and caused to re-form as many times as we like, while the living matter cannot be even dissolved. In the attempt to dissolve it, it dies, and cannot be reproduced.

It is obvious that before particles of living matter pass from the living into the formed state their component atoms, or groups of them, must somehow be made to take up a definite position with respect to one another. Such changes of place as must occur can only be brought about by some peculiar force, property, or power, the action of which is temporary. Seeing that the changes in question can take place only while matter is in the temporary living state—this matter having been detached from matter in the same living condition—the force or power in question must be of an exceptional nature, and of an order different from that to which the ordinary forces or powers of non-living matter belong. This wonderful living power which is postulated causes the atoms or the particles of the matter to take up certain positions favorable to their combination in a certain definite manner. Thus certain substances are formed which have a peculiar chemical composition, and in certain cases special properties and endowments not possessed by substances that can be formed in any other way. It seems to me it would be as unreasonable to maintain that the bricks, or rather the clay of which they are made, or the silica and alumina of the clay, or the properties of the elements entering into the composition of these substances, design, fashion and build the house, as to assert that the formation of living things is due to the physical properties of the materials of which their bodies are composed. Vital power impresses as it were its seal upon the matter—upon the structures of the living organism—and ought surely therefore to be considered as above and superior to the mere stuff that it moulds. Vitality, or vital power, forces, bends, arranges, and fashions just as man himself moulds and fashions the clay he works with, only silently, invisibly, more perfectly, and in a definite and pre-arranged manner, and without mind or will or ingenuity, or instruments or organs,

Judging from the facts, is it not indeed more probable that the ordinary properties, the attractions, the affinities

of mere matter are in suspension rather than in action, while the matter continues to be in the living state? When these properties and affinities come into play, do we not get from the matter that was alive albuminous matters, fat and other things, of known properties and definite composition? But neither these nor any definite compounds existed when the matter was living. They came into being at the moment of its death. The idea of these substances existing in the living matter is inadmissible, for if they were there, some of them could be demonstrated. Such a substance as fatty matter cannot, of course, exist in the living state; fat cannot grow and form fat out of materials which contain the elements of the substance in different states of combination, any more than granite can. If it be conceded that during the living state the ordinary properties and affinities of the matter are suspended, it will be admitted that none of the ordinary properties of material particles can be reasonably credited with the ability to interfere with the exercise of affinities; and therefore it seems reasonable to conclude that some totally different power, *vitality* or *vital power* (which same, unlike the ordinary properties of the matter, is lost or ceases to act when living matter dies), is the true cause of the exceptional state in which the material particles are held while the matter remains living.

But thought may take us yet further. Gradually passing inwards towards the centre, through vast concentric layers of particles, we arrive at last in imagination near the centre of a particle far too minute to be visible, where the atoms of lifeless matter first live. As to the actual nature of this wonderful change which occurs, we are, and from a purely physical point of view must remain, in darkness. For it is certain that the new temporary living state is absolutely distinct from the non-living state in which the matter existed but an instant before. Before long this will, I doubt not, be generally admitted by those acquainted with the facts and not biassed by previous confessions or beliefs.

It is invariably in living matter devoid of structure and form, that all those wonderful actions of surpassing interest which result in the development of form the most striking and structure the most elaborate, are carried on. Forces or powers, but of a non-material order, transmitted through succeeding particles of the same kind, and continuously operating, it may be upon vast quantities of matter, through centuries or centuries of centuries (millions on millions of years"), are the activities by which the re-arrangement of the elements under certain fixed conditions which eventuate in definite and predetermined form, structure, and composition, is brought about. The changes, conversions, formations in question, at present invisible and undemonstrable, require considerable time for their completion. Compared with the visible phenomena which succeed them, and which may be watched, described and delineated by us, they are slow indeed. During days, weeks and months, in darkness and in silence, arrangements and re-arrangements of the most complex character incessantly and quietly proceed, as we say, in obedience to *laws* (though we do not *know*), ere the first visible traces of the new being can be discerned by the most careful investigation.

Remember that the changes in question affect a mere modicum of matter. A grain, nay, the hundredth, the thousandth part of a grain, and far less than this may at one time constitute the material substance from which springs a tree that in its maturity will comprise tons of matter, every grain of which will be stamped with individuality. Is it not, then, most strange that in these days which surpass all previous time in the passion exhibited by men to see into the nature of things, that attention should be so much absorbed in considerations relating to the mere matter of which a living thing is made, while the study of the forces and powers which have effected the forming and shaping of the material substance is not only almost wholly neglected, but positively discouraged?

And yet these forces or powers fashion the germ and cause it to be like its predecessors, or modify its character and cause it to give rise to forms perhaps not before attained. With what shall these forces of the living world, operating so marvellously upon infinitesimal particles of matter, be compared? The changes have been likened to those which take place in the formation of crystals, which can be dissolved and caused to re-form as often as we choose; to the aggregation of particles of lifeless matter which can be made to separate or aggregate as we will; to machines which are made by us in separate pieces and afterwards put together; and to many other things between which and living particles there is not the faintest resemblance or the slightest analogy. Uninquiring, unthinking persons have been, and are at this time, misled by crude and false comparisons, and deceived by forced and fancied analogies. The coarse materialism of our day ought long ago to have been dismissed with scorn as unworthy of the age in which we live, and of the acceptance of any one who would not disgrace himself by helping to force thought back again to the point it had reached more than two thousand years ago.

No one acquainted with the facts of vital change can doubt that phenomena of the same order as those in operation to-day attended the development of primeval forms of life. For not only do we meet with living matter producing the same structures as existed during early periods, but it is probable that some of the living things now growing and multiplying are identical with some that existed in the very dawn of life-history. Unbroken *continuity, descent, derivation*, in operation through the ages without change in power or property, or alteration in form or composition; *repetition* without gain or exaltation; *continuous descent* without degradation or improvement; monotonous succession without progression or advancing evolution. Nevertheless, we are expected to accept the dictum that amid these myriads of myriads of similar organisms, here and there one more fortunate or more gifted than the rest—we are not told why, when, or how—became endowed with the marvellous power of endless modification. We are asked to believe that rigid laws uniformly operating with the same consequences, for ages, suddenly changed, and that long-imposed uniformity gave place to capability of differentiation. But if we try to realize what, according to the terms of the hypothesis must have happened in the living matter, into what a sea of fantastic conjecture do we plunge! The new or modified powers must have originated in or emanated from particles in the very centre of minute living spherules. When we consider the minuteness and insignificance as far as the mere matter is concerned, of the living particles we are referring to, many will, I think, be inclined to admit that it is at least as probable that new forms of living matter of this infinitesimal minuteness originated anew, as that forces which had been in operation for ages, under inexorable unchanging laws, were entirely and suddenly changed or removed, and replaced or supplemented by additional and very different forces obeying very different laws.

Moreover, as no direct or positive evidence of a reliable character has yet been obtained in favor of the direct conversion of non-living matter of any kind into a living form, while there is nothing to indicate that the passage from the non-living to the living was effected by gradual change, as has been suggested by some, it is as reasonable to assume that several infinitesimal life-forms with very different powers of development sprang at once into life, though the ultimate form to be assumed was postponed for ages, as that one single living form only was so formed with the power both of endless monotonous repetition, as well as of infinite and never-ceasing capacity of variation and change, one or other of these opposite attributes being accidentally exercised or capriciously taken advantage of by such of the descendants as were

assured that they were above all the most fitted to survive.

Doctrines of evolution are, no doubt, an advance upon the direct mechanical formation of fully formed organisms hypothesis; but although some evolutionists have so expressed themselves as to lead us to infer that an idea so absurd as the above had been entertained, it need scarcely be said the inference is their own and totally unfounded, suggested by themselves for the satisfaction of ridiculing it and exposing its inferiority to their own hypothesis. No doctrine of evolution yet put forward seems to afford any help to those who are familiar with the characters of the living matter of different organisms, as far as these can be elucidated by any means at present known. Evolutionists generally do not take cognizance of the difficulties which are so patent to microscopical observers. Some of them have hardly condescended to notice the living matter, out of which and by which all the forms of life they profess to account for are developed. It is true that it has been suggested that there are structural differences in the apparently similar manner, which structural differences result in the production of such dissimilar beings; but speculations concerning hypothetical structure are as futile as those which deal with the hypothetical form and properties of the hypothetical inhabitants of Jupiter.

All living matter is, I repeat, structureless, and it is to the power rather than to the mere matter we must look for the explanation of the marvellous differences in the beings evolved by different kinds. The similarity of various embryos of different animals has often been alluded to, and it has been said, for example, that at a certain period of development the embryo of man could not be distinguished from that of a dog. That there is a general rough resemblance is perfectly true, but, on the other hand, any one who examined the minute structure of corresponding tissues and organs, would not find the likeness so great as is supposed, while he would be struck with a great number of points of difference. Not one structure could be found in any part of one embryo which did not exhibit peculiarities by which it could be distinguished. It would, therefore, scientifically be more correct to say that the embryos were *not like one another*, than that *they were like*. But any argument based upon the likeness, if it existed, would not help the evolutionist, inasmuch as the "likeness" is far greater at an earlier stage of existence, before any form or structure whatever has appeared. Every living form comes from an equally structureless material, and the forms near one another in the scale are not more like one another than they are like forms far above or far below them. If, for example, the evolutionist would examine embryonic living matter at a very early period of development, he would discover not only that man and dog were not to be distinguished, but that not one form of living matter could be distinguished from any other form in nature; nay, the living matter which might become dog or man could not be identified by any means at our disposal, or distinguished from that which belonged to amœba or plant, and yet it is put forward as a discovery of recent date that certain properties manifested by the tissues of animals also characterize some of those plants.

But after all, the assumed likeness is but a likeness in certain general points, and those who wish us to draw certain conclusions from their statements, ought to be asked to point out how it is that every cell, every issue of the embryos they regard as being alike or identical, exhibits peculiarities and individual characteristics of its own as regards elementary arrangement, rapidity of formation, rate of growth, duration of existence, and a number of other points. Again, the statements about the changes occurring during development in the lower animals being represented by identical changes occurring during the earlier periods of development in the higher, are correct only when taken in a very rough and general

way. Such phenomena, it is said, show unity of plan, and favor the hypothesis of the descent of jelly-fishes from sponges, and of man from apes. No doubt they do if the mind is already prepared to receive such ideas. Those, however, who really study the operations of nature in her inner recesses where and while she is at work, will certainly often find where identity is affirmed, diversity really exists. Rough general resemblances can no doubt be pointed out, and be made much of, by those who do not look too closely or intently; but those who examine minutely and patiently will find that in very many cases the general resemblances will be outnumbered and outweighed by specific irreconcilable differences and individual peculiarities.

If then we examine living matter in that early period of development ere any structural peculiarities whatever have been manifested, we shall be face to face with the problem of life. For it is at this time, when the matter is without form, that the dispositions of the material particles, which at length result in the development of form, are made. Preparation is made for the division of the mass of the living matter into several portions, and for the orderly disposition of these in respect to one another, as well as in respect of the new masses which at some future time are to be detached from them. Throughout the whole period of the life of many organisms, similar wonderful changes are continually taking place, at least as respects the living matter of certain parts and organs; but we have no means of distinguishing the living matter which continues monotonously repeating similar changes, from living matter which divides and subdivides into masses, which in turn gives rise to successive generations of living particles, which may differ from one another and from all that have gone before, in *power*.

As far as I am aware, no form of the doctrine of evolution yet enunciated takes into account the phenomena of the living matter in which and by which all the changes recognized and professed to be explained are carried on. And yet it is only by these actions in living matter that evolution can be made to appear a plausible hypothesis. Only by carrying out very careful investigations on this formless, structureless living matter can we reasonably hope to obtain anything approaching an accurate conception of the wonderful working of real living nature. It seems to me that the "nature" of the evolutionist is but a fanciful and highly colored picture in which ideas suggested by investigations in stockyards and shambles are depicted, with the addition of the horrible scenes assumed by a vivid imagination to be enacted in the supposed everlasting fight for existence and scramble for mastery, in which conquerors are always being conquered by creatures just a shade more fitted to survive than themselves. Here is creation by destruction in a never-ceasing scramble going on for millions on millions of years, in which the only thing certain seems to be that the greatest misery is assured to the greatest number; life succeeding life, without good or reason or joy or hope; peaceful nature a continual massacre of experimental forms to be massacred in their turn, and these by more; a constant struggle to survive, in which success is rewarded by extermination. The "nature" of evolutionists is a very strange nature indeed, in which oppression, destruction, and tyranny seem to be the chief agents in creation and formation, development and advancement.

But besides the evolution of living forms and of the different organs, we are to believe in an evolution of matter, an evolution of worlds, of suns, of systems. Religion, law, and justice, art, science, and even thought are all products of this universal, never-ending evolution. But what is evolution, and who has given to the term an accurate definition? We shall be told there is evolution and evolution. One man's evolution goes too far, another's not far enough, and there is no general agreement as to what is meant by evolution, and whether the use of the term

should be restricted to the living world or extended to the universe—though it must be obvious to any one who considers the question that the evolution of a living form and the evolution of the matter of a stone are as far removed from one another as are the question of the nature and scope of Infinite Power and the nature and properties of a gas or a metal.

Herbert Spencer has defined his "evolution" to be a change from an indefinite incoherent homogeneity to a definite coherent heterogeneity, through differentiations and integrations. But is not every one of these polysyllabic words as elastic as the word the meaning of which they are to explain? Every assertion made is wanting in proof, and most of the words may be used in totally different and even in opposite senses.

Any one who ventures to express a doubt concerning the absolute correctness of the assemblage of vague and even contradictory conjectures comprised in any hypothesis of evolution, is in danger of being abused and called names. He may be denounced to the world as a contemptible person who has made a vile and abusive attack upon some infallible authority who affirms himself to be the real discoverer of all the secrets of all the molecular machinery of creation. We now live under the most ridiculous of all forms of despotism. It has been said that we must accept such and such views or be debarred from accepting anything! But is it possible for any unbiassed person to accept implicitly doubts, vague suggestions of what may be, or can be, or might be—speculations, hypotheses, conjectures concerning things that lived under conditions which are in great part only conjectural? Probably no living person accepts as it stands 'The Origin of Species,' and it is doubtful whether the first chapter, or even the first sentence of the first chapter, would hold its ground without considerable alteration and qualification if subject to searching critical examination.

The facts known to microscopical observers in connection with the act of living of the smallest particle of the simplest forms of living matter are no more to be accounted for by any of the extravagant crotchets lately advanced as explanations of the facts, than are the general broad phenomena of nature which are under the observation of all. Evolution is a wholly satisfactory explanation only to those whose minds have been trained to submission to evolutionary authority, and who have brought themselves to regard things as they have been told they ought to regard them, instead of venturing to use their senses, and reasoning on the facts presented to their observation—and indeed see for themselves with their own eyes instead of accepting, without ever seeing, what they are told has been seen by eyes which are supposed to be specially privileged to see.

As evidence of the nonsense often advanced in favor of some form of evolution, let me quote a few sentences from an article on "Butterfly Psychology," published in the *St. James's Gazette*. Like most advocates of evolution, the writer has the knack of telling his story in such a pleasant way as to make people imagine that he is explaining the nature and cause of things he describes, while in truth he is doing nothing of the kind. He explains nothing at all, but merely announces astounding assumptions based upon conjectures of his own, or of others.

"In early life the future butterfly emerges from the egg as a caterpillar. At once his many legs begin to move, and the caterpillar moves forward by their motion. But the mechanism which set them moving was the nervous system, with its ganglia working the separate legs of each segment. This movement is probably quite as automatic as the act of sucking in the new-born infant. The caterpillar walks, it knows not why, but simply because it has to walk. When it reaches a fit place for feeding, which differs according to the nature of the particular larva, it feeds automatically. Certain special external stimulants of sight, smell, or touch set up the appropri-

ate actions in the mandibles, just as contact of the lips with an external body sets up sucking in the infant. All these movements depend upon what we call instinct—that is to say, organic habits registered in the nervous system of the race. They have arisen by natural selection alone, because those insects which duly performed them survived, and those which did not duly perform them died out. After a considerable span of life spent in feeding and walking about in search of more food, the caterpillar one day found itself compelled by an inner monitor to alter its habits. Why, it knew not; but, just as a tired child sinks into a sleep, the gorged and full-fed caterpillar sank peacefully into a dormant state.”

Of course all this may have been written in joke. The writer may possibly be laughing at evolutionists. The “inward monitor” of the “gorged and full-fed caterpillar” undoubtedly looks rather suspicious, but one hardly likes to hint at anything so serious. Evolutionists will, I dare say, repudiate such “evolution” as a mere travesty, but it is quite time that half-a-dozen evolutionists who agree on main points should clearly state their belief.

In conclusion, let me ask you as students of nature's processes, whether you have not seen enough to convince you that the revival of the assumption which has been abandoned and reintroduced many times during the last few centuries, that the lifeless is the sole origin of the living—that in fact the non-living and the living are one—is now unjustifiable, and cannot be reasonably entertained. This monstrous fallacy, though taught with the greatest confidence, is based on assumption, and is supported by arbitrarily selected facts, and by not a few misrepresentations and dogmatic assertions. Whenever any form of this false doctrine has been successfully forced into popularity, it has led to the adoption and propagation of the most grievous errors and grotesque conceits.

COMET OBSERVATIONS AT PRINCETON.

The weather has been so unfavorable at Princeton, that we have been unable to make any very satisfactory measures upon the spectrum of the comet. On Saturday evening the comet was visible fairly for an hour or so, before it descended into a bank of cloud. On Sunday evening it was beautifully seen for about half an hour, and then was obscured by a fog which still continues.

The spectrum of the nucleus is very bright. It is apparently continuous, though there may be a little special emphasis at the points where the usual carbon lines ought to appear. The spectrum of the coma and of the tail is precisely like that of most comets, showing three bands which coincide sensibly with those given by the flame of a Bunsen gas-burner, presumably due to a hydrocarbon of some sort.

On Saturday evening the nucleus looked much like a star-fish, having five projecting points formed by jets of light protruding from the central globe to a distance of from four to ten seconds of arc. These jets were not equal in length or brightness, and were not symmetrically disposed with reference to the axis of the comet's tail. Two of them were somewhat curved, they were all diffuse and blunt at the extremity, rather than pointed.

On Saturday, instead of jets, the nucleus had a nearly circular envelope surrounding it, sharply defined from the coma. Its diameter was perhaps 20", but the fog came on before any measures could be made. This disc of light, surrounding the nucleus, was not uniformly bright—it was more brilliant on the side next the Sun, and there was a curious dark opening in it of oval form,

some 20° one side of the axes of the tail. We were preparing to study the spectrum of this envelope critically, when we were cut off by the mist.

Although the Comet is now receding from both Sun and Earth, it is rising so much higher in the Northern Sky each night, that if the weather becomes favorable, it may yet be possible to get something more satisfactory; but just at present the rain is pouring and the prospect is rather dreary.

C. A. YOUNG.

PRINCETON, N. J., June 27, 1881.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. No notice is taken of anonymous communications.]

LOCUSTS AND SUN SPOTS.

To the Editor of "SCIENCE."

SIR: Perhaps you will permit me to explain one inapposite word occurring in my communication on the above subject.

When I stated that European migrants come north and east, I should rather have said *north and west*, the set of the migrations, as far as known, is on European areas north and west; and in this direction, butterflies, sphinx moths and locusts, whose point of departure has been traced to Southern Asia or Northern Africa, travel periodically; the occurrence being made known to us by their vanguard, so to speak, sweeping over the eastern shore of Great Britain. That this track is not voluntarily chosen by instinct, but rather due to a prevailing south-easterly direction of the winds, rests now-a-days on a great amount of experience.

A. H. SWINTON.

GUILDFORD, ENG., June, 1881.

THE BLUE COLOR OF THE SKY.

Prof. Cornu having established the fact that the atmosphere of the earth exercises an energetic absorption upon the ultra-violet rays of the spectrum, whose limit varies according to the statement of the atmosphere and the altitude of the sun. Prof. Hartley sought to attribute this limitation to the influence of ozone. His experiments have demonstrated.

1.—That the ozone is a normal constituent of the higher atmosphere, where it is more abundant than on the earth.

2.—That this quantity of atmospheric ozone suffices to limit the spectrum in the ultra-violet region, without considering the absorption caused by the great density of the oxygen and nitrogen.

3.—That the blue tint of the atmosphere is due to the presence of ozone.

In respect of this last point, Prof. Hartley remarks that, if the ozone exists in the high regions of the atmosphere, the light reflected by clouds at a great height has a blue appearance because it traverses a gas of this color. It is so likewise with the light illuminating the distant portions of a landscape. Experiments have shown that 25 milligrammes of ozone for every square centimeter of a layer of 80 kilogr. thick can produce this phenomenon.

WE learn that Prof. H. S. Prichett, Director of the Glasgow Observatory, has been appointed Professor of Mathematics in Washington University, St. Louis, Missouri.