side of the storm receives its winds from the land, and the western side from the sea; and, in accordance with this, the eastern side should have the greater, and the western side the lesser inclination, as is the case. The fact that European storms have a less velocity of progression than those in this country would still further allow the land and sea conditions to control the inclination in the former region.

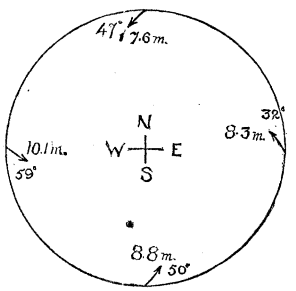

FIG. 21.

Fourth, it is manifest from all the preceding cases that the outermost winds of a storm are nearly radial, and that their direction becomes more circular as they advance. This results directly from the faster motion and less radius, consequently the greater centrifugal force near the centre, and requires no special illustration. It need only be noted, in recalling the first or latitude condition, that, at large distances from the centre, equatorial storms are generally more radial than those of the temperate zones; but, at small distances from the centre, this rule may have to be reversed. This is quite in accordance with the greater size but less intensity of the storms in the temperate zone.

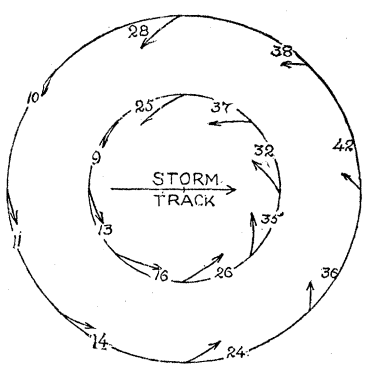

FIG. 22.

Fifth, in regard to altitude. The absence of strong friction will allow the upper winds to whirl in even more circular paths than they do at sea. Indeed, at a moderate altitude, say 7,000 feet, the winds are probably perfectly circular in the core of the storm; and at a little greater height they assume an outward inclination as they change to the outward spiral of the upper overflow. It is common, therefore, to note that the surface-winds of a storm are not parallel to the motion of the clouds. As the latter are more fully in control of the earth's deflecting force, they will always tend to the right of the former; and, in the extreme contrast of surface-indraught and uppermost outflow, the cirrus-clouds may drift slowly (in appearance) 90° or 120° to the right of the surface-winds. It is therefore usually to storm-disturbances of the general atmospheric circulation that the irregular drifting of different cloud-layers is to be ascribed. And now, after this long digression, we may return to the rescue of the vessel in the West-Indian hurricane.

(To be continued.)

THE BUSINESS OF THE NATURALIST.[1]

THE Society of naturalists of the eastern United States is an association in which all preliminaries should be brief, and ceremonious speeches out of place. Our first official meeting at Springfield was, however, almost wholly occupied with the technicalities of organization, and we necessarily gave but little time to other matters. The attendance at that meeting, on account of the natural aversion of scientific men to details of such an uninteresting nature, was small, compared with the numbers now present; and our list of members is also more than double what it was then. Under these circumstances a few preliminary words of explanation will not be wholly without usefulness. Our correspondence with scientific men also shows that the novelty of the organization and objects of this society requires some explanation in a comprehensive and condensed form from some one person.

So far as I am aware, this is the first attempt to form an association for the transaction of what may be called, without derogation to the dignity of our future labors, the business of naturalists.

Heretofore scientific associations have been founded and conducted upon the idea that the technical interests of science were necessarily inseparable from the results of scientific work, and should be considered by the same body which also attends to the presentation, discussion, and publication of the records of discovery and research. It has seemed to me for at least seven years past, that, on the contrary, a division of labor was necessary, and ought to be brought about. The technicalities of science have increased to an enormous extent within the last decade; and some effectual means of mutual culture and

[1] Address delivered in New York before the Society of naturalists of the eastern United States, Dec. 28, by the president, Professor Alpheus Hyatt of Cambridge.

co-operation should be found which can be of great benefit, not only to those whose opportunities have been small, but also not less to those who are capable of contributing most in such a scheme for the general good of science-workers. The contact of fellow-workers not only stimulates the intellect to its best efforts in the presence of appreciative hearers, but enables the mind to broaden its outlook, and avoid the effects of the cloister-like seclusion in abstraction, which has had such fascination for the students of all ages, and which has also had such serious effects upon the usefulness of individual life. The misconceptions and difficulties which science has to contend with have also become of greater importance; and one has only to mention the word 'vivisection' to justify this remark, and at the same time indicate a field for practical effort on the part of this society, which should bear good fruit in the immediate future. In fact, whichever way we turn, whether to the purely practical details of making sections, or other preparations in any branch of natural science, or to the broader questions of a technical nature which interest the public at large, we find in every direction paths of usefulness opening, which must lead to beneficial results for the future of science and science-workers, if properly and judiciously handled.

They seem to us to embody questions which are vital to the unimpeded progress of science. We can, it is true, get along without any efforts to ameliorate the present condition of affairs; but will this be the most desirable course for the interests of science and for our own future satisfaction? Will the amount of time we may gain for investigation by remaining at home, and standing aloof from disturbing causes, repay us for the inevitable loss of influence, and the possible loss of future facilities for the prosecution of work? In some classes of work such losses are sure to be visited upon us, or our immediate successors, through the growth of ignorant prejudices we have taken no trouble to correct or prevent.

An able writer in *Science* of Oct. 26, on the subject of vivisection, points out the necessity of taking some immediate steps for the information of the public upon this question, and, it seems to us, uses very able arguments to support the conclusion, which is, that "the only danger lies in the ignorance of the great majority of ordinarily well-informed people regarding such subjects." This writer, in conclusion, remarks with great force, "*Secrecy*, not publicity, is what American physiology has to fear."

The society may disagree with me, and perhaps consider it unnecessary to take any active steps in this direction; but the unavoidable effects of the general discussion of such a question will be very reassuring to the men who will have to bear the brunt of the coming struggle; and every one who takes part in it will find that his opinions and future course may be more or less influenced, and perhaps even determined, by what he may hear.

Those most deeply interested in the American association will surely be willing to grant that such questions can be more effectively handled in a society composed of purely professional men, whose undivided attention can be given to them, whose interest is of the deepest nature, and who can be depended upon to give sufficient time and work when appointed on committees.

Another question which seems to me of absorbing general interest relates to a matter about which great differences of opinion may exist, even among scientific men themselves; and in this I speak purely as an advocate of one side. What can we do to call the attention of the institutions of learning to the fact that their duties to science and the future of investigation demand a change of policy? Throughout the country, and even in the higher institutions, false views are prevalent with regard to the qualifications necessary for teaching science. We find science-teaching placed on the same basis as mathematics and the languages, in which books are the necessary media for the communication of ideas. It is commonly supposed that a man can learn his lesson, and repeat it to scholars, and that one may be a good teacher of a science of observation without being himself an observer. In some places even, a tendency towards investigation is considered a disqualification, since it withdraws the mind from giving full attention to the practical duties of the classroom. In such places education is measured by the quantity, and rule of thumb, by the amount of supposed knowledge gained, without relation to how it is gained, or what habits of mind are cultivated in the operation. Undoubtedly, the teacher in such places may need and acquire a certain amount of dexterity and success as a mental taxidermist; but that he will ever intentionally train a single student to do original work is beyond belief.

The slight amount of respect and consideration shown to the claims of the investigator are in part due to this evil, and in part to a custom which is excessively hard to deal with. We refer to the habit, very prevalent in this country, of sending children to the same colleges at which the parents themselves have been graduated. This habit shows some signs of breaking up, and the technical schools are doing fine work in this direction; still, the American mind is conservative in respect to education, and tends to keep the hereditary colleges full, irrespective of their intrinsic worth. If these institutions should have to rely solely upon their educational attractions, we should find that the individuality of instructors, their reputation for sound learning and original thought, and their capacity to do the highest kind of teaching, would eventually command the same respect, and perhaps the same emoluments, as in Germany.

Can we, as a body, arrive at any general agreement of what should be done with regard to such vital questions? or can we even do any thing towards the formation of an opinion of what it would be desirable to do? This last result will seem tame to many energetic minds; but the speaker is old enough to have seen the mighty effects of active and determined agitation upon what is familiarly known as public sentiment. Sooner or later — and generally much sooner than any but the most sanguine agitator can anticipate — the times become ripened, and the last

steps of the process of change to the new order of things follow in rapid succession. An event may be long in preparation, but its consummation takes place with a rapidity which must be experienced to be fully appreciated.

Another question of the greatest and at present time-absorbing interest is, what can be done to force the schools to properly prepare students for the colleges and universities? We use the word 'force,' rather than 'induce,' because all arguments except those which can be supported by the pressure of the entrance examinations fail to awaken these schools to the needs of science-teachers in these higher institutions. The following remarks appeared in *Science* of May 18, 1883, and can be used appropriately in this connection:—

"In the brief, informal discussions [which took place at the Springfield meeting], the opinion was very generally expressed, that one of the most important questions with which we have to deal, and one which needs immediate attention, is the preparation necessary for the study of natural science in colleges. The great difficulty in making a success of college instruction in the sciences lies in the fact that not one young man in twenty knows either how to observe, or how to think about facts of observation. His education in that line is very deficient, or else entirely wanting; he is utterly helpless without his books, and seems quite unable to see or to correlate facts for himself. No other branch of the curriculum is so inefficiently treated by the preparatory schools and academies. It is the reverse of right that the college professor, with a class of from forty to eighty men, should have to make the vain attempt to teach the lowest step in the observational sciences. Methods which can alone guarantee success in imparting to the eye and the mind the rudiments of science cannot be employed under such conditions. Moreover, it is a matter for the deepest regret, that young men who are soon to be in places in the world where they have no books, and where the keenest exercise of the powers of observation, and the judgment of facts, are demanded, should in so many cases have no opportunity, or next to none, either in school or college, for the acquisition of a training upon which the success of their life-work, in the larger number of professions and occupations, is dependent.

"It is to be hoped that one needs only to mention such objects as these, to bespeak for this new association the sympathy and support of all naturalists, and earnest workers in science."

In the above remarks expression is given to opinions some of which, we know, will meet with general approbation, and others will very properly be regarded as merely personal views. We shall, however, have attained the object for which this address was written, if we have made it evident that this society can, if it be so disposed, take up questions of the highest importance to the public service of science, and help towards their solution by its deliberations. We believe it can do this wherever it can unite the majority of scientific men in opinion and in effort. The power which can be wielded by such an organization is in exact proportion, not to its numbers, but to its earnestness, determination, and especially its fearless support of what is just and right.

After referring further to the work of the society, as outlined in the article already referred to, Professor Hyatt proceeded:—

Enough papers to occupy nearly the whole time which can be devoted to them will be announced by the secretary. Though these and kindred subjects will be our most important objects, it was due to the society to show that its scope was not necessarily wholly confined to such details; and this we have endeavored to accomplish in the first part of the preceding remarks.

In conclusion, we beg leave to report that the executive committee has had great responsibilities thrust upon it since the first meeting. These they have endeavored to meet to the best of their ability; and we believe that the present attendance, and the many honorable names on our list, will help to extenuate the errors inseparable from haste and overwork.

In place of Professor Clarke, whose absence in Europe we regret, the executive committee appointed Dr. C. S. Minot, and he has faithfully and acceptably performed the duty of secretary *pro tem.*

THE NEW MORPHOLOGICAL ELEMENT OF THE BLOOD.

WITHIN recent years it has been established beyond doubt by the labors of Hayem, Bizzozero, and others, that there exists in the blood of mammals, and apparently of other vertebrates, a third type of corpuscle, differing morphologically from both the red and the white corpuscle, and possessing certain distinctive properties of the greatest importance in coagulation. These elements were called hematoblasts by Hayem upon the supposition that they are eventually transformed into red corpuscles. As this view is by no means established, it will be better to speak of them as blood-plates, the name given to them by Bizzozero. These blood-plates must not be confounded with the 'invisible corpuscles' of Norris. The latter, according to the testimony of most observers, are simply ordinary red corpuscles, from which the haemoglobin has been removed by the method of preparation. As might be supposed, the presence of these bodies was more or less clearly noticed by some of the many observers who for years past have made the blood a subject of investigation. That they escaped detection in the great majority of cases, is owing, doubtless, to the very rapid alterations which they undergo after the blood is shed, unless especial measures are taken to preserve them.

To Hayem belongs the credit of their real discovery. His investigation of their form, and, to a certain extent, of their properties, was so thorough, and his method of demonstrating their presence so simple, that the attention of other observers was forced to the subject; and his results were soon confirmed, with the exception of certain details of structure which are still open to investigation. On account of the quickness with which they are destroyed after the blood has escaped from the vessels, it is necessary to make use of certain preservative liquids which have the power of fixing these corpuscles in their normal shape. The solution recommended by Hayem is composed, of water 200 parts, sodium chloride 1 part, sodium sulphate 5 parts, and mercuric chloride .50 parts. Bizzozero recommends a .75% solution of sodium chloride, to which some methyl aniline violet has been added. Osmic-acid solution, 1%, may also be used. To obtain good specimens of the blood-