that ' that little twinkling star,' as he expressed himself, should be able to send its light to us."

Noteworthy is Professor Stokes's opinion (p. 83) of the astonishing conclusions of Young and Forbes as to the varying velocities of propagation of different wave-lengths in vacuum; for his doubts as to their validity seem founded only upon the fact that the conclusions depend upon the judgment of the eye of a single observer.

We shall await with interest the publication of the next year's course, which is to be devoted to researches in which light has been used as a means of investigation. The third year's course will "be assigned to light considered in relation to its beneficial effects."

NOURSE'S AMERICAN EXPLORATION IN THE ICE-ZONES.

American exploration in the ice-zones (etc.), prepared chiefly from official sources. By Prof. J. E. NOURSE, U.S.N. Boston, *Lothrop*, 1884. 3 + 578 p., illustr., maps. 8°.

THE work of Professor Nourse does not profess to be, and is not in any sense, a study of the results of arctic exploration performed by Americans, or of the relation of American explorations to explorations made by the people of other nations. It is simply a collection of narratives of the different expeditions, — gotten up, like the stock compilations, by hack-writers, — which are published on various subjects from time to time. It is a book undeserving of high praise, either in its contents or its make-up. The only thing which redeems it from perfect mediocrity is the fact that it contains some data in relation to the North Pacific exploring expedition, under Rodgers, the report of which still remains unpublished, and a few facts from Hooper's report of his voyage in the Corwin in 1881, the original of which has not been made public.

The record is complete only for the naval and military expeditions. Those of the telegraph explorers, 1865–68, are not even mentioned, though much of their work was in really arctic regions; and the indirect results of their explorations have added one-seventh of its area to the present United States, and have contributed at least one hundred titles to geographical bibliography. The travels of Kennicott and others in the Hudson-Bay region, of Nelson in northern Alaska, the work of the coast-survey in and north of Bering Strait in 1880, are left to other chroniclers. We presume this may be accounted for by the fact that the investigations referred to, and their value, are familiar only to students, specialists, and geographers, and not easy of access to the mere compiler.

From a literary point of view, the work is open to severe criticism. The thread of the narrative is frequently broken for the most trivial digressions, which are pursued at great length. The misprints are numerous, and generally of that objectionable kind which confuses the sense, without being obvious to the ordinary reader. Trifling matters are detailed at length, while more important ones are omitted.

In spite of all this, the book will be attractive to youthful readers who are not critics, and enjoy unfamiliar details, and to whom the really weightier matters are not important. It is fully illustrated by cuts drawn from Rink, Bessels, Hall, Hayes, and various government publications, and is accompanied by the worst map of the circumpolar regions which we have ever encountered.

INTELLIGENCE FROM AMERICAN SCIENTIFIC STATIONS.

GOVERNMENT ORGANIZATIONS.

U. S. geological survey.

Paleontology. — Mr. C. D. Walcott has prepared the manuscript for a report on the St. John fauna of New Brunswick, contained in the Hartt collection. It is ready for publication as a bulletin of the survey, and only awaits the completion of the drawings illustrating it to go to press.

During April the collection of Devonian fossils from the Hamilton group of New York was transferred to the U. S. national museum, and recorded. The collection was made about Moravia, N.Y., by Mr. Cooper Curtice, during a portion of the field season of 1883. It also included a quantity of specimens collected by Mr. Curtice prior to his becoming a member of the geological survey. The collection consisted of fifteen hundred and seventy-seven specimens, containing sixty-two genera and a hundred and eighteen species.

Dr. C. A. White, during May, was occupied mainly with the examination of fossils forwarded from California by Mr. G. F. Becker, and in preparatory study for his proposed work in the mesozoic and cenozoic areas of California during the coming season. Dr. White started for California the 2d of June, and will probably take the field first in the Clear Lake region, and make a section towards the coast.

Mr. J. B. Marcou has about completed the sorting and arranging of the type specimens in the National museum, and will soon take the field. He will devote his time to the study of the mesozoic and tertiary formations along the Atlantic coast, especially in New Jersey, Maryland, and Virginia, and possibly in North Carolina, beginning in New Jersey.

Prof. L. C. Johnson has assorted and labelled all of his collections made last season, so as to show the localities from which they were obtained, and the geological horizons which they represent. He has now left for Mississippi, where he will begin to collect in the cretaceous and in the older tertiary.

Prof. William M. Fontaine is still engaged in the study, classification, and description of the fossil plants from the younger mesozoic strata, and in the preparation of drawings in illustration of his work.

Prof. H. S. Williams reports progress in his work of elaborating the material collected by him, and in writing his report upon the comparative study of the Devonian faunas of western New York.

U. S. signal-office.

The progress of tornado investigation.[1] — In the study of tornadoes it has become necessary to undertake something more than a simple record of their occurrence, or an occasional investigation of those that are attended with unusual destruction to life and property. A practical knowledge of the nature of these destructive storms is a matter of the utmost importance to the inhabitants of certain sections of the country; and not least among the objects aimed at by the chief signal-officer, in directing the continuance of tornado investigation, is to allay any needless anxiety or fear on the part of those people living in the regions most frequented by these storms. Methods of observation based on reports from stations situated from one hundred to two hundred miles apart, as in the case of cyclones and hurricanes, are inadequate to develop the mysteries of the funnel-shaped tornado-cloud.

As a consequence, therefore, a new plan was devised, based on the result of special investigations in 1882 and 1883, by means of which it is now sought to study more intimately the origin, character, frequency, and geographical distribution of tornadoes.

To inaugurate the details of the proposed system of work, it became necessary to establish a corps of observers, whose duty should be to report the occurrence of tornadoes, and make examinations of their paths and various phenomema; for which purpose special definite instructions are issued.

The observers are called tornado reporters, and now number about eight hundred. Their stations are mostly located in the states of Alabama, Georgia, South Carolina, North Carolina, Missouri, Arkansas, Kansas, Illinois, Indiana, Iowa, Nebraska, Wisconsin, and Minnesota. These are the states in which tornadoes are of most frequent occurrence: and this distribution limits our study to certain states, and even certain portions of a single state; for there are portions of some states that are frequently visited, and other portions seldom, if ever, visited by tornadoes. In the regions of greatest frequency the stations number from one to three in each county, depending upon its size.

Tornado reporters, in return for their voluntary contributions, are supplied with the tornado publications of the signal-service; they are also furnished with the material necessary for the proper record and mailing of observations and reports.

Reports are forwarded to the chief signal-officer as soon as possible after the occurrence of a tornado, and consist of detailed descriptions, instrumental observations, photographs, diagrams, charts, and illustrations.

While attention is mainly given to the examination and report of tonadoes for the current year, each reporter is instructed to work up the past history of these storms in his state, making careful search after any facts relating to windfalls, or other traces of past tornadoes. Some of the results sought to be attained by the above method of investigation may be briefly given as follows: 1°, to determine the origin of tornadoes, and their relation to other atmospheric phenomena; 2°, to determine the geographical distribution of tornadoes, and their relative frequency of occurrence in different states, and in different parts of the same state; 3°, to determine the conditions of formation with a view to the prediction of tornadoes; 4°, to determine the means of protection for life and property; 5°, to determine the periodicity of the occurrence of tornadoes, and their relative frequency by seasons, months, parts of month, and time of day; 6°, to determine the prevailing characteristics of tornadoes; 7°, to determine the relation of tornado regions to areas of barometric minimum.

A review of the past year gives the following as some of the principal results: —

1°. That there is a definite portion of an area of low pressure within which the conditions for the development of tornadoes is most favorable; and this has been called the 'dangerous octant.'

2°. That there is a definite relation between the position of tornado regions and the region of high contrasts in temperature, the former lying to the south and east.

3°. That there is a similar definite relation of position of tornado regions and the region of high contrasts in dew-point; the former being, as before, to the south and east.

4°. That the position of tornado regions is to the south and east of the region of high contrasts of cool northerly and warm southerly winds, — a rule that seems to follow from the preceding, and is of use when observations of temperature and dew-point are not accessible.

5°. The relation of tornado regions to the movement of upper and lower clouds has been studied, and good results are still hoped for.

6°. The study of the relation of tornado regions to the form of barometric depressions seems to show that tornadoes are more frequent when the major axis of the barometric troughs trend north and south,

[1] Communicated by permission of the chief signal-officer, U. S. army.

or north-east and south-west, than when they trend east and west.

7°. Tornado predictions have been made a matter of daily study since the 10th of March, 1884; and the average up to June 1 shows that it has been possible on fifty-five days to successfully predict from the morning weather-map that no tornado would occur on that day. On twenty-eight other days tornadoes were predicted for particular states or larger regions; and of them the tornadoes on seventeen days occurred in or near the specified region, while on eleven days tornadoes occurred in regions for which they were not predicted.

JNO. P. FINLEY,
Sergeant signal-corps, U. S. army.

RECENT PROCEEDINGS OF SCIENTIFIC SOCIETIES.

Trenton natural-history society.

June 10. — Mr. F. A. Lucas described the building-habits of some birds. The cat-bird seems indifferent as to locality, building ten feet from the ground, or quite as often in a tangle of weeds within eighteen inches of the surface. The song-sparrow's nest is small and delicate, resting on the ground, often in a slight depression, which makes it very inconspicuous. —— Dr. C. C. Abbott remarked on crayfish; also on a catfish new to the locality, and on field-mice. He had taken the meadow-mouse (Arvicola riparia) from a dead log, where it had hollowed a nest, lining it with hay and a few feathers; also from driftwood into which it had tunnelled. The food seems to be chiefly seeds, although it is probably carnivorous at times. Under the loose bark of decaying, prostrate trees, the white-footed mouse (Hesperomys leucopus) is occasionally found, although it usually makes a home in a thicket of briers or a deserted bird's nest. The favorite food is unfledged birds. They are much afraid of snakes. They beat a hasty retreat when a dead snake is placed near the nest; but when convinced, by cautious examination, that the intruder is harmless, they bravely devour it. —— Prof. A. C. Apgar remarked on some rare plants: Vicia Americana, Muhl., never before observed in New Jersey; Viola pubescens eriocarpa, Nutt., a western variety; Polemonium reptans, L., which had been removed from the Geological survey's preliminary catalogue of New-Jersey plants, under the supposition, that, being so remote from its usual habitat, it must have been incorrectly determined; Nuphar pumilum, Smith, and Struthiopteris Germanica, Willd., the last not having been previously observed in the state. —— Dr. A. C. Stokes communicated a paper on Tarantula arenicola Scudder, detailing its method of burrowing, of building the tower above the entrance, and of capturing food. Before the pit and tower are completed, the spider will seize food at some distance from the aperture: when finished, she leaps from the tower, and runs across the ground to take the selected victim. If within the burrow when an insect passes over the tower, or becomes entangled in the loose grass of which it is usually formed, the spider rushes to the top, and the insect, if acceptable, is seized. The towers are irregularly five-sided, and an inch or less high. The burrows are cylindrical, perpendicular, and vary in depth from eight to twenty inches; in diameter, from one-quarter to three-quarters of an inch.

Entomological society, Washington.

June 5. — Mr. George Marx read a composite paper on the geographical distribution of the Arachnidae of the United States, on the respiration of Epeira insularis, and biological notes on Latrodectes verecundus. The range of each family was pointed out in succession; and the colorational changes, dependent upon locality, were treated at some length. The speaker had noticed a true alternate opening and closing of the pulmonary stigmata of the Epeira, on taking it from a tight box in which it had been confined for some days. By a careful rearing of the Latrodectes, he had thrown together no less than ten species described by Abbott, which are now referable to the different stages of L. verecundus. —— Mr. E. A. Schwarz exhibited specimens of Ino immunda (Cucujidae) and Eleusis pallida (Staphylinidae), calling attention to the marvellous resemblance, which he stated could not be referred to mimicry for protective reasons, but must be considered accidental. —— Mr. L. O. Howard exhibited specimens of Inostemma Boscii (Proctotrupidae), and gave a short history of the theories concerning the curious thoracic appendage, arriving at the conclusion that it is a secondary sexual character. He also exhibited specimens of a new species of the genus Schizaspidia, collected in Florida by Mr. Schwarz, and which is also furnished with remarkable thoracic prolongations. —— Dr. W. S. Barnard read a short paper on the development of Gordius and Mermis, exhibiting a specimen observed to issue from Harpalus pennsylvanicus.

Brookville society of natural history, Indiana.

June 3. — Robert M. King presented a paper upon some studies of the land-shells of Indiana, showing differences in habits, food, and color of the shell. —— Aug. Diener gave a short paper upon the Luna moth, presenting the time of its appearance, and the length of periods of its several changes. —— E. R. Quick spoke at some length on the results of the trip of Alexander Wilson down the Ohio River in 1810, referring particularly to Wilson's advice concerning the opening of the Grave Creek mound, and to his labors in the neighborhood of Cincinnati, at the mouth of the Big Miami River, at what is now the town of Vevay in Switzerland county, this state, and in the neighborhood of Louisville, — all points of interest, because of their proximity to the field in which the society is working.