

abreast of his progress in physics. It is by these three staunch aids alone that the trio of physiology, physiological chemistry and pharmacology may be successfully faced.

It may be objected that the man who sacrifices his biological training—and by this I mean takes no more than the present minimum required by the medical school of his selection—while he may find himself in better shape for physiology, etc., will not be better off in his medicine and surgery later on. By the same voice we shall hear that *general practise* does not need this scientific underpinning. I do not know what the training of that vague person, the “practical family doctor,” should be, but I do know that he will make poor shift to graduate well from the modern medical school unless he heed his early training, and poorer shift still to keep up with current medical literature later on if he has failed to appreciate the direction in which medicine is growing.

The constant establishment of surgical and medical research laboratories with the consequent injection of scientific methods into the practical branches, is a matter of general comment, and emphasizes the large influences which are shaping medicine into a science. It is possible that most men who advise college premedical students are somewhat aware of the facts which I have tried to bring out in this paper, but feel strongly that such early and emphatic specialization as has been advocated may have a narrowing influence. If this be their attitude they are not consistent in permitting wide excursion into anatomical biology with the idea of better equipment for medicine later on, and it is against the futility of such a course that I protest.

It is often hard to point out to students the utility of subjects, essentially somewhat abstract, in their relation to medicine. This is especially true when one is confronted by the fact that medical school catalogues do not advise the prospective student to fulfil the given requirements, and then if possible to extend his course in the directions I have indicated. Yet there is no doubt that the man well grounded in these fundamental subjects,

which become very inaccessible after the medical school is once entered, possesses an advantage over his less fortunate fellows which can be turned to most vivid and permanent account.

CECIL K. DRINKER

DEPARTMENT OF PHYSIOLOGY,
HARVARD MEDICAL SCHOOL

THE AURORAL DISPLAY OF AUGUST 26

TO THE EDITOR OF SCIENCE: The notes by Dr. Nutting and others in SCIENCE on the Aurora of August 26 have been read with much interest by the writer. None of these, however, mentions the appearance of this phenomenon from a point as far south as Washington. On the evening in question, I was sitting on the front porch (facing north) of my residence here. It had been quite a warm day and in the north was a heavy bank of clouds in which lightning had been playing all through the twilight and early evening; the sunset glow seemed to be unduly prolonged back of this bank of clouds. My attention was first called to what I took to be a small, faintly luminous cloud, about the shape of a mirror image of the map of Nevada, which covered a portion of the constellation of the Great Dipper. The length of this supposed cloud was about equal to that of the handle of the Dipper, with the longer axis at right angles to the handle. After persisting for some time this little patch moved away rather rapidly to the west and disappeared, only to reappear in its original position after the lapse of several minutes. Meanwhile, the seemingly prolonged sunset glow above the bank of clouds in the north had become a fringe of pale steady light, apparently extending out over the edge of the cloud a considerable distance. While the small patch of light over the Dipper soon disappeared again, the glow back of the cloud bank persisted for a long time. No distinct color was observed, the light being a uniform faint white; no streaming or other movement was observed, except that of the small patch of light already described.

F. ALEX. McDERMOTT

WASHINGTON, D. C.,
October 26

THE auroral display of August 26 described by Professor Nutting and others in recent numbers of *SCIENCE*, I observed from Lucasville, 10 miles north of the Ohio River in Scioto County, Ohio. This is in practically the same latitude as Washington and much farther south than the observations recorded to date of writing. It took the form of a bright, white, uniform illumination of the entire northern heavens, which extended in decreasing intensity almost to the zenith. Although watched intermittently for about an hour between 8.30 and 9.30 o'clock, no color bands, streamers, curtains, moving light waves, pulsations or other phenomena were observed, nor was any tendency to increase or diminish in brightness detected.

The same display was witnessed by many lake-shore campers at Cleveland, and was noted by Cleveland papers the next day. The diffused character of the light over the lake and its greenish color were particularly noted.

J. E. HYDE

WESTERN RESERVE UNIVERSITY

TO THE EDITOR OF *SCIENCE*: In connection with Professor Nutting's vivid account in a recent number of *SCIENCE* (p. 496) of a remarkable auroral display witnessed by him at Lake Douglas, Michigan, it is perhaps of interest to record that the same or a similar display was observed that identical evening in a region as remote as the Glacier National Park, Montana.

At about 10: P.M., August 26, while Mr. E. H. Dole and myself were returning from the Many Glacier Hotel to the nearby Teepee Camp on Lake McDermott, our attention was attracted by a peculiar bright glow quite low on the horizon in the eastern sky, as though from the lights of a great city. We were much puzzled by it until we had emerged far enough from the disturbing glare of the electric lights to discover that a similar, though weaker glow was in the west, and indeed that an evanescent shimmering arch of light extended not only clear above us, but well past the zenith into the southern sector of the heavens. Unfortunately our view to the north was effectually

obstructed by the gloomy bulk of Altyn Peak and the canyon wall, but by this time the auroral nature of the phenomena was evident to us. While too shut in by the narrow valley to secure the full enjoyment of the display which so enthralled Professor Nutting, that which we saw seemed sufficiently remarkable. The light extended over the sky and seemingly diffused through the whole upper atmosphere in so general a glow that here also its real brilliance was difficult to appreciate. Quavering streams of light—an everchanging sheen, sometimes brighter here, sometimes brighter there—never uniform—no simile could be more delightfully suggestive than Professor Nutting's allusion to the photogenic play of the meridional bands of Ctenophores as seen in darkened water. The same comparison forced itself into my own mind at the time.

S. STILLMAN BERRY

REDLANDS, CALIFORNIA,
October 19

TO THE EDITOR OF *SCIENCE*: I was much interested to read in the current number (October 20) of *SCIENCE* the records of places at which the auroral display of August 26, 1916, was seen. All five of the notes in this issue report observation of the display at points to the east and northeast of the locality reported by Professor Nutting in *SCIENCE* of October 6.

Following the suggestion of Professor Baker, I wish to record having observed the same phenomenon during the same evening at Amery, Wis., fifty miles northeast of St. Paul, Minn. The same remarkable features so well described by several writers were in evidence—the ever-changing, ebbing and swelling pulsations and the shimmering streamers of light, fading and intensifying at the same time in different parts of the heavens—but no marked exhibition of color so far as noticed. The center of the display was near the zenith and practically the whole sky was occupied except at times a rather narrow indefinite band or strip in the south.

Mr. Paul B. Sears, also a member of this department, informs me that on the same night he observed the display at Madison in northeastern Nebraska. The phenomenon exhibited

practically the same features in this locality as in Wisconsin and Michigan.

This information may be of interest as extending considerably the recorded area over which the display was visible.

WILMER G. STOVER

OHIO STATE UNIVERSITY,

October 24

TO THE EDITOR OF SCIENCE: I have been greatly interested in the descriptions of the auroral display of August 26, and would like to add a word to what you have already published. I observed the phenomenon at Ephraim, in Door County, Wisconsin, between ten o'clock and midnight; other observers at the same place reported to me that it lasted until long after midnight. The description of the display as given by your contributors corresponds in the main with my own observation, but with one difference: I saw two distinct color regions in addition to the white pulsation described by all the others. At the zenith the color was white, but in the east there was a region that changed several times from pure white to a brilliant rose color, while in the north there were streamers of delicate green. The universal, shadowless illumination was very remarkable, as was also the display in the southern sky, where the streamers reached almost to the horizon.

JOHN C. HESSLER

THE JAMES MILLIKIN UNIVERSITY

October 21

TO THE EDITOR OF SCIENCE: I have been interested in the reports of the auroral display of last August, by Professor Nutting and others. The aurora was seen with all the brilliancy and variation of colors described by Professor Nutting, at Lake Minnetonka, near Minneapolis, Minn., on the 26th of August.

We were out in a boat, and, when well out in the lake, there appeared what at first seemed to be the glow thrown on the eastern sky by a fire. The light was not as red as that produced by a fire, and there were no clouds in the sky where the light first appeared. As we watched it, it soon became evident that the light was not from a fire but that of an aurora.

It appeared a little to the north of east down near the horizon, gradually rising and forming an arch across the northern sky a little higher than is usual for auroras in Minnesota. Then another band appeared below the first and lower down in the north. These bands were not as definite as in most of the auroras that I have seen in Minnesota, nor did they show the vertical bands of light, but the diffuse light seemed concentrated in these two regions.

Then more rapidly the light mounted upwards and as it reached almost to the zenith there suddenly was formed what seemed a vortex of scintillating iridescent light. Pausing here for a moment the light continued to extend on to the southern half of the sky until it reached nearly half way to the southern horizon, or until nearly all of the sky was lighted with this constantly changing light in bands, and areas.

The rapidity of change both in distribution as well as in color of the light was fully as marked as that described by Professor Nutting.

We watched the display until ten o'clock, and others said that it was even more brilliant later.

H. B. LATIMER

UNIVERSITY OF NEBRASKA,

October 23

TO THE EDITOR OF SCIENCE: Among the reports on the unusual auroral display of August 26, I see none from farther west than Michigan. It might be of interest to readers of SCIENCE to know that this display was visible in all its splendor at Winton, Minnesota, north of Duluth, and was very much as described by Professor Nutting, except for the lack of color which he describes.

R. R. HUDELSON

UNIVERSITY OF MISSOURI,

October 26

TO THE EDITOR OF SCIENCE: Unfortunately, I was not further west than Brainerd, Minnesota, on August 26, but that is in the same latitude and five hundred miles west of Lake Douglas, in Michigan, where Professor Nutting saw the auroral display. These displays are common occurrences in the wintry months in this locality, often being brilliant, but in

recent years none compared with this one. Together several of us observed it until almost twelve o'clock, but its greatest brilliancy and intensity was seen before eleven. Among the striking things was the rapidity of the movements, the brilliancy at the zenith, and the distance to which the bands of light extended into the south. It seemed as though the light originated near us, so bright was the display at the horizon in the north. The color was variable from light-green to light-yellow and gray.

CARL ZAPFFE

BRAINERD, MINN.,
October 25

TO THE EDITOR OF SCIENCE: Since the accounts of the aurora of August 26 in SCIENCE for October 6 and 20 covered only an area from Michigan eastward, it will be of interest to know that it was observed at least as far west as the Front Range of the Rockies in northern Montana. We were camped at the time a few miles east of the old postoffice of Saypo or west of Chateau in Teton County, some eight miles east of the mountain front. The phenomena here were very much like those described by others. I give them from memory.

As the brilliant, yellow, diffused light of sunset faded in an absolutely cloudless sky, an arch of white light became visible extending across the sky from east to west, perhaps 60° from the northern horizon. North of this were three or four broad vertical bands of white, the lower ends somewhat fringed as they are so often shown in illustrations, but I noticed no streamer-like motion. The arch slowly moved southward, mounting in the sky. Between nine and nearly eleven I saw nothing further of the aurora, but when we looked at it again, shortly before eleven the east and west arch was only some 20°-30° above the south horizon and all the rest of the sky to the north of it was aflame with white lights, which, as I remember it, waved and flickered irregularly, but incessantly from all sides towards the zenith. A few minutes later all traces of the auroral glow seemed to have disappeared.

Though I saw only white lights myself, some

people whom we spoke to next day mentioned a pink glow.

MARCUS I. GOLDMAN
U. S. GEOLOGICAL SURVEY,
WASHINGTON, D. C.,
October 31

TO THE EDITOR OF SCIENCE: It is interesting to note that the auroral display of August 26 was visible in southwestern Montana. Owing to the prevailing atmospheric conditions it appeared to be of a different character there. The writer and a companion, being engaged in geologic work in the Beartooth Mountains under the direction of the University of Chicago, were at that time camped just below the rim of one of the high plateaus on the northeastern side of the range, at an elevation of about 9,500 feet. The most violent thunderstorm of the season had swept over the plateau the previous evening. In the morning great banks of fog rolled up from the canyons, completely hiding the plateau for the greater part of the day. Toward evening the fog lifted slightly, and about nine o'clock a luminous rosy light was noticed in the northeast. It was a steady glow that spread from the horizon, which was quite high, far up in the sky. No streaks or shafts of light of any sort were seen during the half hour that the light was observed.

A feature of the occurrence as viewed in that locality, which has not been reported elsewhere, was the repetition of the phenomenon on the following evening, but on a much smaller scale. From the bottom of the canyon a faint glow was seen over the rim of the plateau, but it was observed for a short time only.

ARTHUR BEVAN
UNIVERSITY OF CHICAGO,
October 30

TO THE EDITOR OF SCIENCE: The auroral display of August 26, first described in your columns by Professor C. C. Nutting, was also observed from the Columbia River Gorge, forty-five miles east of Portland. I was a member of a party of geology students from the University of Chicago and on the night of the display our camp was located on the north side of the river at Collins, Washing-

ton. The light first appeared from the northeast in the form of a brilliant belt of pearly white, the rays of which seemed to converge toward a center somewhat below the horizon. It became so intense and the direction of the belt shifted in such a fashion that some members of the party at once thought it was the headlight of a train approaching around a curve. In a very few minutes the display changed to a brilliant array of streamers with intermediate belts of diffused light, all of which seemed to diverge from a common center. At this stage it resembled very much the corona type of aurora, with the exception that the streamers reached almost to the zenith. The intensity of the light and the position of the streamers were constantly changing, but the source from which they seemed to diverge remained fixed for almost half an hour. Finally this aspect of the display vanished, and there appeared a broad band of diffused light that began swinging across the heavens from the original position in the northeast to an east-west position and extending from the eastern horizon through the zenith almost to the western horizon where it faded out. It remained fixed in this position for at least fifteen minutes, during which time it gradually narrowed and grew in intensity until its width might well be compared to that of a rainbow and its brilliance became more striking than ever. At length it began to fade away and finally disappeared. At no time did we observe the coloring described by Professor Nutting. The phenomenon first appeared between nine and ten o'clock Pacific Standard time, which was not very far in absolute time from that of Professor Nutting's observation in northern Michigan.

W. L. FOSTER

UNIVERSITY OF CHICAGO,
November 2

ON August 26 I was in camp with Dr. Walcott at Hector, a station on the Canadian Pacific Railway, practically on the divide of the Rocky Mountains in British Columbia.

The view northward is limited by a mountain ridge two thousand feet or more above the camp. Mountain masses are not far dis-

tant to the southeast and southwest, but to the east, south and west the view is quite extensive.

At 8:40 P.M. (two hours slower than eastern time) a faint "curtain" of light appeared in the northeast, well above the mountain. Immediately afterward this was extended by waving columns of light to the eastward and westward: then a veritable "glory" appeared spreading across the northern hemisphere. Long beams of light as though from huge searchlights flamed across the sky, curtains and bands formed in swaying folds. A little later, about nine o'clock, the whole heavens were included, with rays extending from the zenith to the horizon (as limited by the topographic features).

There seemed to be a shower of light surrounding us, which gradually faded. Up to this time the light was white or very pale green in places. Immediately followed a gorgeous display of colored lights, reds, greens, blues, more nearly in the north. In the whole display the motion of light was from east to west.

R. H. CHAPMAN

WASHINGTON, D. C.

TO THE EDITOR OF SCIENCE: It may interest the readers of SCIENCE to know that the auroral display of August 26, which has already been extensively commented upon in these columns, was visible in the Selkirk Mountains in British Columbia, upwards of three thousand miles west of the extreme easternmost locality in Nova Scotia reported by Professor Heyl. Auroral displays are not infrequent during the summer months in the Selkirk Range, but the one in question was the most brilliant, and otherwise the most remarkable, of all that I have seen in this region during an experience covering the greater part of six summers. It may, or may not, be of significance that it came shortly before a period of twelve consecutive rainy days, during which thunderstorms—usually relatively rare in the Selkirks—were both numerous and violent, and severe hail-storms also occurred

over a wide area. Miners in this part of British Columbia believe that in the winter a particularly brilliant display of the aurora is likely to be followed by a heavy fall of snow, but I am unable to determine how far the actual records bear out this belief.

M. H. JACOBS

UNIVERSITY OF PENNSYLVANIA

SCIENTIFIC BOOKS

The Life of Inland Waters. An elementary text-book of fresh-water biology for American students. By JAMES G. NEEDHAM, Professor of Limnology in Cornell University, and J. T. LLOYD, Instructor in Limnology in Cornell University. Octavo of 438 pages with 244 illustrations. 1916. The Comstock Publishing Company, Ithaca, New York.

Needham and Lloyd have produced a very good and very useful book. It is well planned, well executed and well illustrated. It deals with the life of fresh water—chiefly the microscopic forms and the insects—from the point of view of environment and mutual adjustment. It is, therefore, not a handbook for identifying forms, nor is it a treatise on limnology and its methods, or even on fresh-water biology. It is not a “popular” book, to be read with full intelligence and interest by a person ignorant of biology and of fresh-water life in particular. It is rather a book to accompany the study of fresh-water biology in laboratory and in the field. It gives the general points of view, the grouping and correlation of facts, which such a student needs if he is not to become entangled in a hopeless web of details. This it does in moderate compass and with sufficient detail to make the principles clear, definite, and, therefore, useful to the student.

The subject is handled under four main heads: (1) the nature and the types of aquatic environment; (2) aquatic plants and animals; (3) adjustment of plants and animals to conditions of aquatic life and to each other in aquatic societies; (4) inland water culture. The reviewer finds the fourth head the least

interesting, though not the least important from a practical point of view. Less has been done and, therefore, there is less to be said about this matter as yet. The third head (Chapters V. and VI.) shows the book at its best. The interrelation of plants and animals and the adjustment of both to environment are here discussed. Chapter V., for instance, treats first of individual adjustment to aquatic life, whether in open water or on the bottom. Methods of floating, swimming, etc., are described for the open-water forms, and methods of burrowing, shelter building, motion on and through the mud, etc., for the bottom forms. Adjustment of the life cycle to seasonal changes in the aquatic environment is then considered, involving such matters as statoblasts and winter eggs. Mutual adjustment is briefly treated and illustrated by the insectivorous marsh plants and by the larval habits of mussels. Chapter VI. deals, first, with limnetic societies, primarily divided into those of open water and those of the shores. The former includes the plankton (persistently spelled “plancton” by the authors—doubtless with reformers’ intentions); the latter set includes the shallow-water societies passing into those of ponds, pools and marshes. The chapter concludes with an account of the lotic societies, or those of streams. All of these forms of association are well described and especially well illustrated.

Of course any specialist will see places where he would have written the book differently, and places where he would have enlarged or reduced the space given by the authors. One must regret that the fascinating and valuable subject of mutual adjustment is so briefly treated. The emphasis on insects will seem somewhat disproportionately large to students of other groups. It seems to the present reviewer that the account of physical conditions of life in lakes has not the vigor of the ecological chapters. Here and there the subject is somewhat fumbled, as in the treatment of lake temperatures. The summer temperature conditions of Cayuga Lake, shown in