To show that such a state of affairs is not without exception, I will mention the state normal school of Michigan. The faculty of that institution comprises about twenty-five persons (exclusive of the practice school), of whom *four* are assigned to the department of English language and literature, *four* to the department of mathematics, and *six* to the two departments of science. It is not a dozen years since only one teacher was engaged exclusively in science teaching, but the rapid development of science courses, along with specialization of departments, has brought the present gratifying conditions. But what appears to me of much greater significance is the introduction of science teaching into the practice school. The catalogue of that department outlines a course in science studies for the grades one to eight inclusive, making it equally prominent with the other subjects. This course is of necessity rather crude, and the teaching, I venture, is more so, yet the hundred and more young teachers graduated from the institution each year must carry away with them many practical ideas of the new work, gained during their senior year of observation and practice teaching.

Having at hand the catalogues of the several normal schools of Wisconsin and Minnesota, I am pleased to find in them the same evidences of progress. As four or five schools are sustained by each of those states they are necessarily much smaller than the Michigan institution, consequently department lines can not be so strictly drawn around related subjects, and numerical comparisons are not easily made. It is noticeable, however, that the sciences are generally taught by persons who devote their energies entirely to that work. But it is the prescribed courses of the graded practice schools that show best the right tendencies of these institutions.

That science teaching in primary schools falls far short of our "dream" is true. That many successful efforts have been inaugurated is also true. The writer enjoys the personal acquaintance of several energetic young principals and superintendents who have organized science courses in their schools, and can recall numerous instances of teachers who are doing creditable work. A very few cities (Muskegon is the only one known to me in this state) have tried the plan of a special teacher or supervisor of science. Under the present conditions this is doubtless the best plan for cities of sufficient size to justify the expense, provided the person employed is a teacher and not a machine worker. The time and energies of the special teacher should be about equally divided between the pupils and the regular teachers. While doing considerable direct teaching in the school rooms, the best work of this functionary should be the instructing, training and inspiring of the teachers, so that, though they may not become at once ideal exponents of the methods of science, they will at least be more willing and efficient helpers.

The present need in science teaching is not so much in the matter as in the manner. Formal dogmatic teaching of the mere facts of science can only add another burden to the crowded curriculum. Rightly used, no other line of work gives to school life so many points of contact with real life. Observation, investigation, experiment, stimulated and directed by the teacher, should be the directions of greatest activity, and discovery should be one of the chief aims and rewards of the pupil. Instead, the average teacher usually forestalls the best activities of the child by beginning with the announcement of what should be the conclusion.

Where the new work has been introduced it is too often regarded by both teachers and pupils as a strange appendage that has in some way become attached to the body of educational matter. It should and will become a properly related part of the organic body. To change the figure, I know from observation that the announcement "Get ready for the science lesson" means to the pupils "Get ready for the weekly dose of this new educational medicine." Experience shows that it is sweet and pleasant to many; to some it is almost nauseating.

The desired all-round improvement in the preparation of teachers must be a gradual evolution from the present movement. No college or training school course is sufficient in itself. The preparation of the future teacher who shall successfully teach the elements of science in their proper relations to other subjects must begin in the kindergarten and continue throughout, constituting an educational experience in which the teachings of nature contribute their equal share.

The "thinking people" who need no argument that the elements of science should be taught in the primary schools are a small minority. In most instances where teachers or school officers have undertaken the work in a systematic manner they have been permitted by the indifference rather than the active consent of the majority. The advocates of science teaching may well be thankful for this toleration of indifference and should make the most of their opportunity.

C. D. McLouth.
Muskegon, Mich.

Birds That Sing in the Night.

The notes which from time to time have appeared in *Science* with reference to the nocturnal singing of birds demonstrate that a considerable number of species are known to exhibit this eccentricity. From my own observations I can corroborate some statements heretofore published, and, I believe, add one or two to the list of daylight songsters guilty of keeping very late hours.

I remember hearing a song sparrow (*Melospiza fasciata*) execute his full song at ten o'clock one dark and cloudy May night in western New York. I listened some time for a repetition of the serenade, but none was given. I have known the catbird (*Galeoscoptes carolinensis*) to sing in the moonlight. During a term of moonlight nights in August I heard the notes of a black-billed cuckoo (*Coccyzus erythrophthalmus*) nightly at frequent intervals for about an hour shortly after midnight. But with the cuckoo this is a well-known occurrence. I have more than once heard at night the twitter of chimney swifts (*Chætura pelagica*) from a chimney.

While on a summer camping expedition in the Cascade Mountains recently I heard cries of the raven (*Corvus corax principalis*) in the darkness, and was awakened on several nights by strange bird notes from the tree tops above our camp. The song—for it might be called such—was presumably executed by some small bird and consisted of a clear plaintive whistle having a tremolo ending. I was at a loss to account for its authorship, for the only bird to be found about the camp in the morning, aside from some woodpeckers, was the Oregon jay (*Perisoreus obscurus*) which I was reluctant to credit with possessing such a voice. However, being as yet unacquainted with the notes of the pygmy owl (*Glaucidium gnoma*) of this region, it occurs to me that the mysterious vocalist may possibly have been this curious little robber.

On two evenings recently at ten o'clock or later I have heard call-notes of some small birds from vacant lots in my neighborhood. They probably came from flocks of migrating finches of some species, whose cries I am as yet unable to identify. They were heard at intervals for more than an hour one evening.

Writing of birds, I am reminded of an incident of another sort which I witnessed a few weeks since. Passing along the margin of a wood my attention was attracted by angry bird notes, which were found to issue from

an Oregon junco (*Junco hyemalis oregonus*) and a Vigor's wren (*Thryothorus bewickii spilurus*) which were engaged in a spirited dispute. They made frequent passes at each other as they darted about the branches of a small tree, sometimes the junco and sometimes the wren being the aggressor. Presently a rufous hummingbird (*Trochilus rufus*) appeared upon the scene, and dashing fearlessly at the belligerents quickly put them both to flight. The wren came my way and alighted on a brush pile not ten feet distant, whither he was hotly pursued by the hummer. The latter overtaking him buzzed vigorously about his ears, while the wren with a fuzzled demeanor endured it for a moment and then sought relief in the depths of the brush heap. J. M. EDSON.

New Whatcom, Wash,, Sept. 13.

NEW FIRE FROM THE LIGHTNING STROKE.

PROFESSOR O. F. COOK, of Huntington, L. I., who has returned from a journey in Liberia, gave the writer a most interesting account of a custom of the Golas of that country. The Golas apparently do not use fire sticks, but preserve fire carefully. When fire follows a stroke of lightning they hasten to secure a light from it, and putting out all the fires in the village, kindle them again from the new fire.

Lightning is very common in the Gola country, where in certain seasons there are five or six thunder storms in one day.

I regard this one of the most important contributions to the question of the origin of fire, and it shows an unexpected attitude towards the fire from lightning.

WALTER HOUGH.

U. S. National Museum, Oct. 17, 1893.

NOTES AND NEWS.

MR. L. C. WOOSTER, who for a year past has been in charge of the Kansas Educational Exhibit at the World's Exposition, has charge of the Science Department in the State Normal School of North Dakota at Mayville. Mr. Wooster has occupied a similar position in the Normal School at Whitewater, Wis.

—Mr. L. B. Avery, who for four years past has been at the head of the Science Department of the State Normal School at St. Cloud, Minn., has accepted the Presidency of the North Dakota State Normal at Mayville.

—The College of Physicians of Philadelphia announces that the next award of the Alvarenga Prize, being the income for one year of the bequest of the late Senor Alvarenga, and amounting to about one hundred and eighty dollars, will be made on July 14, 1894, provided that an essay deemed by the Committee of Award to be worthy of the prize shall have been offered. Essays intended for competition may be upon any subject in medicine, but cannot have been published, and must be received by the Secretary of the College on or before May 1, 1894. Each essay must be sent without signature, but must be plainly marked with a motto and be accompanied by a sealed envelope having on its outside the motto of the paper and within it the name and address of the author. It is a condition of competition that the successful essay or a copy of it shall remain in possession of the College; other essays will be returned upon application within three months after the award.

—Two articles in the November number of the *Atlantic Monthly* will be of particular interest to teachers. These are Horace E. Scudder's "School Libraries," and Ernest Hart's "Spectacled Schoolboys."

BOOK-REVIEWS.

The Science of Mechanics. By DR. ERNST MACH. Translated by T. J. McCormack. Chicago, The Open Court Publishing Co., 1893. 534 p., 12 mo. $2.50.

THIS interesting and learned work is the result of a methematician's study of the historical develoment of the science of pure mechanics—the mechanics of the mathematician, as distinguished from the mechanics of the engineer and the artisan. It is a critical and historical exposition of the fundamental principles of mechanics as rendered by Archimedes, Leonardo, Ubaldi, and Stevinus, in earlier times, and by Guericke, Boyle, Galileo, Newton and their successors in recent times. The development of the principles of statistics by the ancients and the im-