or in any way corrupt the story it was commissioned to tell. What faith! But this is little more than the shadow of an illustration; for Herschell, the astronomer, thought it probable that we can see nebulæ from which it has taken light 300 000 years to reach the earth, during which time the interstellar medium has been faithful in transmitting at the rate of more than 11,000,000 miles per minute the impulse committed to it, notwithstanding its path has been crossed and recrossed by other waves without number. Pen cannot adequately describe the transcendant properties of this wonderful medium called the "lumineferous æther" nor to highly exalt that faith which enables one to implicitly believe the truthfulness of the stories committed to him. One is led to exclaim with the Psalmist "Oh Lord! how manifold are thy works, in wisdom thou hast made them all."

CITY BIRDS OF DENVER, COLORADO.

BY HORACE G. SMITH, DENVER, COLO.

PERHAPS some of your readers would like to know something of the city birds which come about our dwellings in Denver, Colorado, and wherein they differ from the familiar species so near to the hearts of the bird lovers who live east of the Mississippi River.

To be sure, many of the Eastern species, whose geographical range is so extensive find their way, across the Great Plains, to our city at the base of the Rocky Mountains, still true to the type of their eastern friends, but for the most part the species undergo a radical change when we enter the high and arid regions of the Great Plains and become of a bleached and faded appearance which gives rise to subspecies or varieties; or, as is often the case, a new species takes the place of its eastern relative.

Among those species which we have in common, the Yellow warbler (*Dendroica aestiva*) is perhaps one of the most familiar summer residents, and its neat little nest is often built in the shade trees along our streets or in the shrubbery of some garden, and its familiar song is heard even in the heat of midday, when most birds are silent.

Scarcely less noticeable is the Kingbird or Bee Martin (*Tyrannus tyrannus,*) the Cliff swallow and the Barn swallow, whose habits are well known to most readers and may not be detailed here, though I may mention that a pair of Barn swallows has returned to the writer's barn-loft for about fifteen successive years, and when unmolested has reared two broods per season. Their mode of entrance was through an open window, which they usually found shut upon their return migration in the spring, but would soon make their presence known by repeated scoldings and flutterings before the glass and would enter and take possession as soon as the window was opened. Hence I suppose it to be the same pair, though the evidence is not conclusive.

Perhaps the most conspicuous of our summer birds is Bullock's oriole, which takes the place of the Baltimore oriole of the east. This brilliant bird is a common breeder over the entire city, wherever trees are found in which to built its swaying nest, and it is not an uncommon occurrence to find several nests—which have been built in successive years—in the same tree.

I have often watched these birds in the early morning, searching for insects in the arc light globes; their method being to enter the globe for any tempting morsel and then flying to the next in line.

Speaking of the electric lights reminds me of the little House finch (*Carpodacums in frontalis*) whose song often cheers us in the winter time, when most birds are silent. It would be hard to part with this little bird, for his song is rich and pleasing. Being a resident with us, they rear their young near to our homes, usually in trees or crevices of buildings, but being progressive they have lengthened their breeding season by taking advantage of the heat furnished by the electric lights, by building their nests in the lamp shades above the lights, thus being entirely protected from the weather.

The past summer I was told by one of the trimmers that nearly every light on his beat contained one of these nests.

Among other summer residents, more or less common I may mention the Western robin, Mountain bluebird, Warbling vireo, White-rumped shrike, Lazuli bunting, Black-headed groobeak, Western chipping sparrow, Arkansas goldfinch, western meadow lark, Say's phoebe, western wood pewee, Mocking bird and western Kingbird, the latter being a cousin of the Bee martin and having all the habits of his querulous relative.

The Pine siskin (*Spinus pinus*), though considered a migrant with us, occasionally rears its young here; a pair having built their nest in an evergreen in the writer's yard. This is not so surprising when we consider that its natural summer home among the coniferous forests may be found within fifteen miles of Denver, in the mountains.

Parkman's House wren (*Troglodytes ædon parkmanii*) seems less familiar than the eastern bird, at least in the manner of its nesting, for, though not uncommon in our city in migration, it seems to retire to the thickets along our streams to build its nest; usually taking possession of some crevice or deserted woodpecker's hole.

A few winter birds remain with us but perhaps none so common or well distributed as the House finch before mentioned. The western Tree sparrow, Mountain chickadee, Long tailed chickadee, McCown's longspur, Cassin's finch, Harris's and Batchelder's woodpeckers, the Northern shrike and several varieties of Juncos or snowbirds, though the Desert horned lark (*Otocoris a. arenicola*) is the familiar "snowbird" of the region and is often seen in numbers in the outside streets, especially when snow is on the ground.

At other times it is not often noticed though it may be present, for its plumage harmonizes well with its surroundings. Besides these we have an occasional visit from the snowflakes, Red polls and some others.

I make no mention of the host of migrants, which fill our city during the migrations, including rare and curious species of warblers, sparrows, thrushes, flycatchers etc., nor of other summer residents of the region, whose summer haunts are found in woodlands or upon the plains, for this is essentially a paper upon "city" birds. These may receive our attention at some future time.

OVERHEAD SOUNDS IN THE VICINITY OF YELLOWSTONE LAKE.

BY EDWIN LINTON, WASHINGTON, PA.

WHILE engaged in making certain investigations for the United States Fish Commission in the summer of 1890 my attention was called to an interesting phenomenon in the vicinity of Yellowstone Lake, of which I am pleasantly reminded by the following brief but vivid description in a recent report by Prof. S. A. Forbes.

Under his description of Shohone Lake, Professor Forbes, in a foot note, thus alludes to this phenomenon:

"Here we first heard, while out on the lake in the bright still morning, the mysterious aërial sound for which this region is noted. It put me in mind of the vibrating clang of a harp lightly and rapidly touched high up above the tree tops, or the sound of many telegraph wires swinging regularly and rapidly in the wind, or, more rarely, of faintly heard voices answering each other overhead. It begins softly in the remote distance, draws rapidly near with louder and louder throbs of sound, and dies away in

the opposite distance; or it may seem to wander irregularly about, the whole passage lasting from a few seconds to half a minute or more. We heard it repeatedly and very distinctly here and at Yellowstone Lake, most frequentquently at the latter place. It is usually noticed on still bright mornings not long after sunrise, and it is louder at this time of day; but I heard it clearly, though faintly, once at noon when a stiff breeze was blowing. No scientific explanation of this really bewitching phenomenon has ever been published, although it has been several times referred to by travellers, who have ventured various crude guesses at its cause, varying from that commonest catch-all of the ignorant, "electricity," to the whistling of the wings of ducks and the noise of the "steamboat geyser." It seems to me to belong to the class of aërial echoes, but even on that supposition I cannot account for the origin of the sound."

(*A Preliminary Report on the Aquatic Invertebrate Fauna of the Yellowstone National Park, etc. Bulletin of the United States Fish Commission for 1891, p. 215. Published Aprtl 29, 1893*).

In a paper which was read before the Academy of Science and Art of Pittsburg, Pa., March 18, 1892, entitled "Mount Sheridan and the Continental Divide," I recorded my recollections of this phenomenon and reproduce them here with no alteration. Although the style is, perhaps, somewhat lacking in seriousness, the descriptions were made from notes taken at the time and written out while the memory of the facts was still fresh. Indeed, even now, after a lapse of three years, I have a very distinct recollection of the sound, vivid enough at least to teach me how imperfect my description of it is. Words describe an echo very inadequately when one is in ignorance of the original sound, and especially so when he is in doubt as to whether the sound is the echo of a noise or the noise itself.

Following is the account of these overhead noises given in the paper alluded to above and published soon after by the academy:

Overhead Noises.—The last topic which I shall discuss in this somewhat desultory paper, is what I shall call overhead voices.

Lest I be thought to be indulging in some ill-advised or disordered fancy I shall first quote from Hayden's *Report for* 1872, *on Montana, Idaho, Wyoming, and Utah.* Mr. F. H. Bradley, p. 234, in that part of his narrative which relates their visit to Yellowstone Lake, says: "While getting breakfast. [This was near the outlet of the lake] we heard every few moments a curious sound, between a whistle and a hoarse whine, whose locality and character we could not at first determine, though we were inclined to refer it to water-fowl on the other side of the lake. As the sun got higher the sound increased in force, and it now became evident that gusts of wind were passing through the air above us, though the pines did not as yet indicate the least motion in the lower atmosphere. We started before the almost daily western winds, of which these gusts were evidently the foreruners, had begun to ruffle the lake."

With this warrant I shall proceed to decribe as well as I can my impressions of these overhead noises, which appear to belong exclusively to the lake region of the Park.

The first time I heard them, or it, was on the 22d of July, about 8 A. M., on Shoshone Lake. Elwood Hofer, our guide, and I had started in our boat for the west end of the Lake. While engaged in making ready for a sounding on the northern shore, near where the lake grows narrow, I heard a strange echoing sound in the sky dying, away to the southward, which appeared to me to be like a sound that had already been echoing some seconds, before it had aroused my attention, so that I had missed the initial sound, and heard only the echo. I looked at Hofer curiously for an explanation. He asked me what I thought the sound was; I immediately gave it up and waited for him to tell me, never doubting that a satisfactory explanation would be forthcoming. For once this encyclopedia of mountain lore failed to come up to date. His reply was, that it was the most mysterious sound heard among the mountains. From the first this sound did not appear to me to be caused by wind blowing. Its velocity was rather that of sound. It had all the characters of an echo, but of what I am not even yet prepared to give an altogether satisfactory answer. I am afraid that my conclusions are about as satisfactory as those of the Irishman, who having been sent out from camp in the night to investigate a strange noise believed to be made by some wild beast, returned with the announcement that " it was nothing at all, only a noise just." Upon our return to camp I questioned both our guides and one of the packers, who had had much experience in the mountains. They agreed substantially in what they had to say about it. They had never heard it farther west than Shoshone Lake, nor farther east than Yellowstone Lake, and not at all north of these lakes. Hofer thought he had heard it once about 30 miles south of Yellowstone Lake. Dave Rhodes had heard it usually shortly after sunrise and up to perhaps half-past eight or nine o'clock. Hofer said that he had heard it in the middle of the day but usually not later than ten o'clock A. M. Neither of them remembered to have heard it before sunrise.

On the following morning we heard the sound very plainly. It appeared to begin directly overhead and to pass off across the sky, growing fainter and fainter towards the southwest. It appeared to be a rather indefinite, reverberating sound, characterized by a slight metallic resonance. It begins or is first perceived overhead, at least, nearly every one, in attempting to fix its location, turns his head to one side and glances upward. Each time that I heard the sound on Shoshone, it appeared to begin overhead, or as one of the men in the party expressed it "all over," and to move off to the southwest. We did not hear the sound while on Lewis or Heart Lake. The next time I heard the sound was on August 4th, when we were camped on the "Thumb" of Yellowstone Lake. Professor Forbes and I were out on the lake making soundings about 8 A. M. The sky was clear and the lake was quiet. The sun was beginning to shine with considerable power. The sound seemed loudest when overhead, and apparently passed off to the southward, or a little east of south. It had the same peculiar quality as that heard on Shoshone Lake, and is just as difficult to describe. There was the same slight hint of metallic resonance, and what one of the party called a kind of twisting sort of yow-yow vibration. There was a faint resemblance to the humming of telegraph wires, but the volume was not steady nor uniform. The time occupied by the sound was not noted, but estimated shortly afterward to be probably a half a minute As I heard it at this time it seemed to begin at a distance, grow louder overhead where it filled the upper air, and suggested a medley of wind in the tops of pine trees, and in telegraph wires, the echo of bells after being repeated several times, the humming of a swarm of bees, and two or three other less definite sources of sound, making in all a composite which was not loud but easily recognized, and not at all likely to be mistaken for any other sound in these mountain solitudes, but which might easily escape notice if one were surounded by noises. On August 8th, at 10.15 A. M., Professor Forbes and I heard the sound again while we were collecting in Bridge Bay at the northern end of the lake.

While on Shoshone Lake I ventured the suggestion that the sound might be produced beyond the divide east

of us, and be reflected from some upper stratum of air of different density from that below. Hofer evidently considered himself responsible for an explanation of the origin of the sound, and frequently remarked that it reminded him of the noise made by the escaping steam of the so-called Steamboat Geyser, on the eastern shore of Yellowstone Lake, about 6 miles from the outlet. I passed between Steamboat Point and Stevenson's Island twice, but was not near enough either time to hear the escaping steam. Moreover, on each occasion the wind was blowing a lively breeze in the direction of Steamboat Point. On the afternoon of August 9th, at 3.20 P.M. while in a row-boat on the south eastern arm of Yellowstone Lake, near the entrance of the upper Yellowstone River, I heard a sound overhead, like rushing wind, or like some invisible but comparatively dense body moving very rapidly through the air, and not very far above our heads. It appeared to be travelling from east to west. It did not have the semi-metallic, vibrating, sky-filling, echoing resonance of the overhead noises that I had heard before, and was of rather shorter duration. It had, however, the same sound-like rapidity of the other. The sky was clear except for a few light fleecy and feathery clouds, and there was just enough wind blowing to ruffle the surface of the water. If this sound was produced by a current of air in motion overhead, it is difficult to understand why it did not give some account of itself, either in the clouds that were floating at different levels in the upper air, or among the pines which covered the slope that rose more than 1000 feet above our heads, or on the waters of the lake itself.

I am inclined to attribute the typical echoing noise to some initial sound, like that of escaping steam for example, from some place like Steamboat Geyser, and which is reflected by some upper stratum of air, that is differently heated from that below by the rays of the sun as they come over the high mountain ridges to the east of the lake. The sound may thus be reflected over the low divides west to Shoshone, and south to Heart Lake, or even farther in the direction of Jackson's Lake. I am not strenuous for this theory, and will be glad to hear a better explanation of this phenomenon. I have a dim recollection of some legend of phantom huntsmen, and a pack of ghostly but vocal hounds which haunt the sky of the Hartz Mountains. Can any one tell whether there is any natural phenomenon belonging to mountains or mountain lakes, which could give foundation to such legend?

The phenomenon has not yet been successfully explained, and I do not know that any similar phenomenon has been observed elsewhere.

It is to be hoped that some one will investigate the matter soon and give a scientific explanation of its cause.

THE PLACE OF MUSEUMS IN EDUCATION.

BY THOMAS GREENWOOD, LONDON, ENGLAND.

THE most casual observer of educational methods could not fail to notice that the receptive mind of a child or a youth learns from an infinite variety of sources. We all know that we begin at one end of education, but there is no period in life of the most aged where the other end is reached. Frequently, again, that information which does not absolutely form part of the ordinary process of education, but which comes from unexpected quarters, is of as great a service in the development of the mind as any set lessons can possibly be. Whatever becomes suggestive to the mind is of educational value. That Museums have from their very nature the very essence of this suggestiveness is patent. It may be true that of themselves alone they are powerless to educate, but they can be instrumental and useful in aiding the educated to excite a desire for knowledge in the ignorant. The working man or agricultural laborer who spends his holiday in a walk through any well-arranged Museum cannot fail to come away with a deeply-rooted and reverential sense of the extent of knowledge possessed by his fellow men. It is not the objects themselves that he sees there, and wonders at, that cause this impression, so much as the order and evident science which he cannot but recognize in the manner in which they are grouped and arranged. He learns that there is a meaning and value in every object, however insignificant, and that there is a way of looking at things common and rare, distinct from the regarding them as useless, useful, or merely curious. These three last terms would be found to be the very common classification of all objects in a Museum by the uninformed and uninitiated.

After a holiday spent in a Museum the working man goes home and cons over what he has seen at his leisure, and very probably on the next summer holiday, or a Sunday afternoon's walk with his wife and little ones, he discovers that he has acquired a new interest in the common things he sees around him. He begins to discover that the stones, the flowers, the creatures of all kinds that throng around him are not, after all, so very commonplace as he had previously thought them. He looks at them with a pleasure not before experienced, and talks of them to his children with sundry references to things like them which he saw in the Museum. He has gained a new sense, a craving for natural knowledge, and such a craving may, possibly, in course of time, quench another and lower craving which may at one time have held him in bondage—that for intoxicants or vicious excitement of one description or another.

The craving for intoxicants or excitement is often as much a result as a cause. The toilers have few things to occupy their mind, and frequently in their home surroundings much cheerlessness and discomfort. Life is for very many a hard daily grind for mere existence, with little or no relief from the daily round of the struggle to make ends meet. These, and other conditions under which so many live, cannot fail to produce tastes and likings which are not qualified to tend to the uplifting of the mind and the desires by which their life is governed.

It is only those who come closely in contact with the more intelligent of the working classes, who know the nobility of character and the earnest reaching out towards higher things to be found among them, who can be familiar with the intense longing to have within their reach institutions such as Museums, Art Galleries, and Free Libraries, to which they can have easy access. That such as these use the institutions which already exist is most amply and conclusively proved by the ocular demonstration of those who have visited the Museums in any of the large towns of the country.

The nation should never forget that some of its greatest benefactors have belonged to this class of intelligent working men. James Watt, the engineer, Hugh Miller, the stonemason geologist, Stephenson, the collier-railway projector, Arkwright, the weaver-inventor, and scores of others who could be named. Where, indeed, should we have stood as a nation had it not been for the sturdy common sense of the intelligent and thrifty working classes?

Until very recently the great defect of our system of education has been the neglect of educating the observing powers—a very distinct matter, be it noted, from scientific or industrial instruction. The confounding of the two is evident in many books which have from time to