THREE SPECIMENS OF STARLING.

In to-day's issue we reproduce an engraving from Brehm's "Thierleben," showing three interesting species of starling, the *Pholidauges leucogaster*, the *Lamprocolius chalybaeus*, and the *Lamprotornis aeneus*. The first of these is a native of central Africa and western Arabia, where it usually lives in thin woods on precipices or at the foot of mountains, but even those birds that stay on the plains never go far from the mountains. They live in families of from six to twenty members, high up in the trees, seldom descending to the ground, and then remaining there the shortest possible time. These birds are very small and are distinguished from other members of their subfamily by the shape of their beak—which is slightly curved and tapers very much—their delicate but long-toed feet, comparatively short wings, a moderately long tail, and a scaly, glossy plumage. The back and neck are purplish-blue, shading to a violet; the breast is white, and the wings dark brown, bordered with violet. All of the dark parts have a brilliant luster, and on account of iridescence the coloring seems quite different when the bird is at rest or in motion. Even in Abyssinia, which is so rich in birds of beautiful plumage, this one is remarkable. Its eye is light brown, and its feet and beak are black. Its flight is very rapid.

The *Lamprocolius chalybaeus* are quite numerous in northeastern Africa. This is also a bird with glossy plumage, which is so wonderfully lustrous that it will reflect a ray of sunlight as if it were a mirror. The feathers lose most of their beauty immediately after death. The prevailing color of the plumage is a dark steel green, and there are velvety black spots on the wing feathers. There seems to be no difference in the coloring of the male and the female, but the feathers of the young birds are not lustrous. These birds live in the thick forests of the river valleys or the thinner woods of the steppes or mountains of northeastern Africa. In Abyssinia they are found on high ground. They generally live in pairs; but at brooding time—from July to September—they form little companies, and there are often six to eight nests in a tree. They prefer to build in hollows of trees, which they line carefully. The male assists in the care of the eggs and of the young birds. They are bright, happy little birds, flitting about on the ground or among the low bushes during the day, but returning to the high trees at night. Their chirping and calling can hardly be called a song. This bird is often referred to in the legends and songs of Abyssinia.

The *Lamprotornis aeneus* is the best known of its species. It is at home in eastern, western, southern, and central Africa, where little companies of the birds are found together, spending most of their time in high trees, but coming to the ground for worms and insects. Their breeding time is in August, the rainy season which brings the spring of that country, and the eggs are cared for and the young birds are fed by the male as well as the female. The coloring of this bird is beautiful, its head and throat are black with a golden sheen, the upper parts of the wings are dark metallic green, and some of the wing feathers are decorated with velvety black spots; the long tail feathers are a dark purplish-violet, and the breast feathers are copper colored. All of the feathers are very glossy. The eye is light yellow, and the beak and feet are black. Its song is nothing but a repetition of the ordinary chirping and calling. These birds live for a long time in captivity.

1. PHOLIDAUGES LEUCOGASTER. 2. LAMPROCOLIUS CHALYBAEUS. 3. LAMPROTORNIS AENEUS.

NOT only do the forms and character of the blossoms of the chrysanthemum vary greatly, but there is a wider variation in the color than in any other flower.

Drift Mining in California.

The western slope of the Sierra Nevadas in this State, from Mariposa to Siskiyou, contains the great area in which drift mining in California is practicable and profitable. In Nevada, Placer and Sierra Counties is found the richest ground, though Plumas, Butte, El Dorado, Amador, Calaveras and Tuolumne Counties have many important drift mines. There is almost a uniform geological character to this entire district, the main axis of the great mountain range from its summit thirty miles westward being granite. Westward to the Sacramento and upper San Joaquin valleys occur almost uninterruptedly metamorphic stratified rock, slate and limestone forming the largest part. Research indicates that the prehistoric rivers that ran through this region were wide and deep, but comparatively short. Occasionally are found two lines of those ancient channels bisecting each other at almost right angles, indicating their distinct and separate formation in periods of time boundless by ordinary computation. In those old days when the world was young, into these old channels filling up with bowlders, gravel and sand, was also washed gold from the quartz veins. The close of this Pliocene period eons of ages ago was marked by a lava flow covering and sealing that auriferous deposit in some cases a thousand feet deep. In the present geologic period the streams now on the surface, trending more straightly westward than their buried brothers, have eroded through this lava, through the ancient debris, and in many cases through the slate. A part of the gold thus brought to light by Nature's slow processes has been secured by man during the past forty-five years. Its source and fountain seat is only to be unlocked by drift mining. Drift mining may be considered as a branch of placer mining. It was in the early days of placer mining that the origin of the placers was discovered. The miners of forty years ago, as their placer claims were being worked out, naturally looked eastward and upward to the hills, and working higher, came to places beyond which no surface trace of gold was found, the gravel "vein" running into the mountain. In tunneling on the bedrock they found it pitched downward as it went into the mountain, the result being that they were ordinarily drowned out. This was the incipiency of drift mining, the plan adopted being running tunnels on an up grade from the lowest practical point, thus draining the drift and making it easier to move the gravel.

There is no field more promising of returns than the development of drift mines. The preliminary cost of such development can be greatly lessened by judicious expenditure at the start in securing intelligent survey of the ground proposed to be worked. Proper platting of the probable course and grade of the gravel sought by a competent engineer, while not infallible, is far preferable to haphazard prospecting, which often uses up considerable money with unsatisfactory result. Prospecting, of course, is necessary, but before much money is spent the services of a good mining engineer will be found to be a matter of practical economy. A prospecting shaft is rarely necessary where the conformation of the surface will not permit tunnel or drift prospecting from the face of the mountain, that depending greatly on the thickness of the overlying strata of earth and rock. The definite and regular work on a drift mine by shaft is a costly process, tunneling on an easy grade being in nine cases out of ten the cheapest and most satisfactory way. In this branch of mining the risks and expense are counted small when the yield is so great as in numerous familiar instances in California's mining history, where $10,000 was got from one carload of gravel, or where over $750,000 was secured from half an acre of rich ground.

It is probably no exaggeration of facts to say that for every dollar taken from the ancient river channels of California there remains ten to be added to the world's wealth by drift mining.—*Mining and Scientific Press.*

Training Tumbler Pigeons.

We have known many purchases made of "Birmingham Rollers," and great disappointment expressed at the after performance of the birds or their progeny, simply from carelessness in their management. The best flying tumblers in the world, if left to fly at will, will rapidly degenerate. Each flier has its own little details of management, which, after all, matter very little; the essential point is that in beginning to train the birds are only let out occasionally, say every three or four days, and when hungry, be it morning or evening. The reasons for both precautions are: (1) The previous confinement causes them to fly actively at once upon being liberated, and (2) their appetite leads them to a quick return as soon as they have had exercise enough.

They must be fed immediately on return to keep up this habit; plentifully while only occasionally flown, but lightly when, being trained, and let out in the morning, they are going to be let out again in the evening; their full meal being in this case reserved till after the last fly. If of good stock, and first tossed when there are no birds to tempt them to "pitch," they soon get into the habit of bursting off the moment they are liberated; and this habit must be very carefully preserved, weeding out instantly, as soon as discovered, any unusually lazy bird, which would otherwise be a check upon the rest, and may lead them to descend with it. No other system is needed beyond this in training tumblers.—*Liverpool Courier.*

ONE extra good winter blooming fuchsia is speciosa. Given a large pot, light fibrous soil of leaf mould and sand, good drainage and plenty of water at the roots and overhead, it will make rapid growth and flower abundantly from January to April without cessation.

The Moon.

BY LEWIS SWIFT.

The most glorious object on which the eye of man ever rested is the sun, after which comes the moon when shining with a full, round face. It is difficult, indeed, to conceive that an object of such brilliancy is, in reality, a dark one, in itself as devoid of light as is the earth at midnight in the absence of the moon. Moonlight is simply sunlight received second hand, the light of the sun being reflected from the moon's dark surface. This is true of all the planets also, though not of the stars, as they all are suns self-shining as our own, a fact previously given.

If to behold the full moon is a spectacle so inspiring, her crescent with its horns pointing either to the right or left, or, again, upward as she nears the setting sun is hardly less so, and in this place demands special attention, as, from long experience, I find the cause of her assumption of the crescent, the half and the gibbous phases to be very imperfectly understood, it being often imagined, even, that some dark body passes between the earth and the moon, and cuts off her light wholly or in part, and suggests the question often asked of me, "What is the object which thus intervenes?" Of all the countless host of stars, comets and planets, the moon is nearest to the earth, and, consequently it is not possible for any other body to come between her and the earth.

The moon's easterly motion is about thirteen degrees daily, and her complete revolution around the earth occupies about 27⅓ days, but as, during this time, the sun has moved also easterly one degree per day, the moon, to overtake the sun and produce a new moon, has to make more than a complete revolution. This requires a little more than two days, so that from new moon to new again is not 27⅓, but 29½ days, the length of a lunar month. The instant of the new moon is when the moon passes the sun, her illumined side being, of course, wholly turned toward that luminary, and her dark and, consequently, invisible side toward the earth. As she emerges from the sun a constantly increasing portion of her sunny side turns toward us, and we see her first as a slender crescent which nightly grows in size until after the lapse of a little more than seven days after passing the sun she appears as a half moon, one-half of her sunny side being turned toward us, or, as the almanacs say, at first quarter. Nightly, more and more of her bright disk presents itself until, rising when the sun sets, her entire luminous portion is turned to us as well as to the sun, and we see her as the full-orbed moon. Then, in reverse order, the above changes are gone through until a fortnight has elapsed, when she again passes the sun and becomes invisible.

Although the full moon in a cloudless sky floods the earth with radiance and splendor and invests even the most unlovely objects with a softened beauty, yet it would require more than six hundred thousand moons shining at once to equal the light of the sun.

It is a curious and an unexplained fact, and, probably, not an exceptional case in the solar system, that the moon revolves round the earth in exactly the same time required to rotate on her axis, thus forever preventing her posterior hemisphere from being seen, and, therefore, we are and must remain ignorant regarding the topography and scenery of the opposite side.

The inhabitability of the moon has in every age been a fruitful theme for reflection and discussion, but the invention of the telescope has settled the question in the negative. As it is a world entirely destitute of an atmosphere, as it has no water, not a drop, and as its days and nights are, each, equal to two of our earth-weeks, and as, furthermore, no change has been observed since it became an object of telescopic study, we are forced to the conclusion that it cannot be the home of sentient beings and that it cannot sustain life of any sort. Are we then justified in the belief that this heavenly body has been created in vain? No; we owe much to the moon. She raises the ocean tides, and their ebb and flow serve to keep the waters of the gulfs, bays and estuaries of the earth from growing stagnant. And to sailors at sea she is of great service in determining positions.

The moon as a telescopic object surpasses in magnificence all others in the heavens. On favorable occasions she can approach to less than 220,000 miles from the earth, or. from surface to surface, to within 215,000 miles. If at such a time a magnifying power of, say, two thousand be applied. she will be seen as though at a distance of over 100 miles. Under these conditions, an object as large as the Capitol at Washington could be seen as a visible point.

It is not possible for any telescope ever to do better than that. The idea promulgated by sensational writers regarding the giant telescopes that must, when completed, bring the moon to within a few miles or even to a distance of a few yards is wholly erroneous. To see the moon well there is no need of a mammoth telescope, as she has sufficient light to bear a high power, yet our atmosphere is so laden with vapors and lashed with tremors which are magnified as much as is the moon itself, that the close investigation ardently desired by astronomers is prevented thereby, and only low magnifying powers can be used. But the lunar scenery even under these not most favorable conditions is grand beyond the power of words to express. The great telescope of the Lowe Observatory with its incomparable eyepiece, specially adapted for the work, will reveal her mountain heights and craterous depths, her yawning canyons and dry ocean beds, where, when the moon was young, tides ebbed and flowed.—*Mount Lowe Echo.*

The Railway Mileage of the World.

In a recent issue of the *Archiv fur Eisenbahnwesen* are printed a series of tables giving some interesting data regarding the railways of the world. The figures for the year ending December 31, 1892, are as follows:

COUNTRY.	Length miles.	Length 100 sq. miles.	Per 10,000 inhabitants.
I. EUROPE.			
Germany:			
Prussia	16,275	12·1	5·3
Bavaria	3,597	12·2	6·3
Saxony	1,584	27·4	4·4
Wurtemburg	967	12·9	4·7
Baden	1,000	17·1	6·0
Alsace-Lorraine	1,005	18·0	6·2
All other German States	3,027	15·0	5·8
Total Germany	27,455	13·2	5·5
Austria-Hungary, including Bosnia, etc.	17,620	6·8	4·1
Great Britain and Ireland	20,325	16·7	5·3
France	24,018	11·6	6·3
Russia, including Finland	19.656	1	2
Italy	8,498	7·7	2·7
Belgium	3,379	29·6	5·5
The Netherlands, including Luxemburg	1.913	14·0	4·0
Switzerland	2,082	13·0	7·1
Spain	6,771	3·4	3·8
Portugal	1,425	4·0	3·0
Denmark	1,283	8·4	5·6
Norway	971	0·8	4·8
Sweden	5,259	2·9	10·9
Servia	336	1·8	1·6
Roumania	1,622	3·2	3·2
Greece	569	2·3	2·6
European Turkey, Bulgaria, Roumelia	1,130	1·1	1·2
Malta, Jersey, Man	68	...	...
Total Europe	144,380	3·9	4 0
II.—AMERICA.			
United States of America	174,784	6·0	26·8
British North America	14,870	0·5	30·8
Newfoundland	243	0·6	11·9
Mexico	6,625	0·8	5·5
Central America	622	0·3	1·9
United States of Colombia	261	0·0	0·7
Cuba	1,076	2·4	6·6
Venezuela	497	0·2	2·1
Republic of San Domingo	71	0·3	1·4
Puerto Rico	11	0·3	0·1
Brazil	6,390	0·2	4·3
The Argentine	8,163	0·8	18·9
Paraguay	157	0·2	3·4
Uruguay	1,056	1·4	13·7
Chile	1,926	0 6	6·0
Peru	1,036	0·2	3·5
Bolivia	593	0·2	4 1
Ecuador	186	0·2	1·2
British Guiana	22	....	0·7
Jamaica, Barbadoes, Trinidad, Martinique	321	....	....
Total America	218,910	...	....
III.—ASIA.			
British India	17,768	1·1	0·6
Ceylon	191	0·8	0·6
Asia Minor	998	0·2	0·6
Russian trans-Caspian district	890	0·5	12·7
Persia	34	....	....
The Dutch Indies	1,068	0·5	0·4
Japan	1,876	1·3	0·4
Portuguese India	51	3·5	1·0
Malay States	87	0·3	1·4
China	124	....	....
Cochin China, Pondicherry, Malacca, Tonkineto.	142	....	....
Total Asia	23,229	....	....
IV.—AFRICA.			
Egypt	961	0·3	1·4
Algeria and Tunis	1,984	0·6	3·5
Cape Colony	2,444	1·1	15·2
Natal	399	2·1	7·3
Transvaal	194	0·2	2·5
Orange Free State	559	1·1	26·9
Mauritius, Reunion, Senegal Territory, Angola, Mozambique, etc.	671	....	....
Total Africa	7,212	...	....
V.—AUSTRALIA.			
New Zealand	2,008	1·9	30·9
Victoria	2,920	3·4	25·0
New South Wales	2,399	0·8	20·0
South Australia	1,823	0·2	54·9
Queensland	2,352	0·3	55·9
Tasmania	467	1·8	30·6
West Australia	660	....	111·8
Hawaii	56	0·8	6·2
Total Australia	12,685	0·3	31·2
RECAPITULATION.			
Europe	144,380	3·9	4·0
America	218,910	....	....
Asia	23,229	....	....
Africa	7,212	...	....
Australia	12,685	0·3	31·2
Total of the world	406,416	....	

The reports show that the total capital invested in the railroads of the world at the end of 1892 was in round numbers $32,150,000,000, or an average per cost mile for the entire world of a little more than $79,000 per mile.

The Ivanhoe Tunnel.

The Ivanhoe tunnel, the third longest in America. is cut straight through the backbone of the Rocky Mountains from Busk, a small hamlet fifteen miles west of Leadville, Col., to Ivanhoe, another little village on the western side of the main range. The tunnel was designed to save the Colorado Midland Railway a steep climb to the summit of Hagerman Pass, and over seven miles wasted in the curves necessary to enable the engines to pull up the heavy grades. The tunnel is 9,400 feet long, and is only surpassed in this country by the famous Hoosac tunnel and the Bowlder tunnel, in Montana, the latter of which is only 300 feet longer than the Ivanhoe. Where the Ivanhoe enters the mountain at Busk, the altitude is 10,800 feet. This is a much greater altitude that that of St. Gothard, which at Goeschenen enters the ground at a height of 3,640 feet above the sea level and emerges at Airolo, on the Italian side, at a height of 3,756 feet. The road over the St. Gothard Pass is 22 miles, and the tunnel, with its length of 9¼ miles, thus saves 12¾ miles. The Ivanhoe saves much more in proportion, lessening the distance between Busk and Ivanhoe by over 7 miles in its length of less than 2 miles.

The contract for the Ivanhoe, which was let to H. F. Keefe, calls for the tunnel to be 21 feet high and 15 feet wide in the clear; and to admit of timbers, ground was broken to the extent of 22 feet 9 inches by 18 feet 6 inches. To accomplish this task, every twenty-four hours 200 pounds of giant powder and 800 feet of fuse were used. For the first 1,500 feet that were driven a good deal of trouble was encountered from water and loose rock, in many places the rock not being in place. This, at a depth of 500 to 750 feet, caused a great deal of speculation among mineralogists as to the causes which led to this disturbance. It was generally conceded that the acid in the water had cut many and diverse channels in the soft talc and granite, so separating them from the rock in place that when an opening was made from below, a chute was formed, allowing the whole mass to fall into the tunnel. For weeks at a time Mr. Keefe was kept busy removing the wreckage and patching up the cave, and was retarded in the work by the immense flow of water that usually drained out of one of the "soft spots." The flow of water amounted to 100 gallons per minute. Wherever the ground is soft it has been substantially timbered with red spruce, squaring 12×12. The ground that is in place is not closely timbered. In the work of construction the tunnel was lit by electricity, with an arc light every 80 feet, and several heavy air compressors supplied fresh ozone to the workmen at the heading. Eight air drills were kept steadily going at each approach, and the amount driven per day averaged 8 feet. From the center of the tunnel to the surface is a distance of 1,200 feet.

The present grade to Hagerman is 3 per cent, but the grade in the tunnel will be only 1·41 to every hundred feet. This stupendous undertaking was begun in August, 1890. When it is being operated by the Midland, large doors will be put up at the approaches to keep out the snow, and the tunnel for several hundred feet from each end will be heated by steam. Watchmen will be placed at the different ends to open and shut the doors before and after trains entering and leaving. Engines will be coaled up a few miles before entering the tunnel, so that the run through can be made without coaling.

Wyoming's Soda Lakes.

As described by H. Pemberton, Jr., and George P. Tucker, there exists a deposit of sulphate of soda, locally known as a "lake," about fourteen miles southwest of Laramie, Wyo. The deposit is composed of three of these lakes lying within a stone's throw of one another—the Big Lake, the Track Lake, and the Red Lake—having together a total area of about sixty-five acres. They are the property of the Union Pacific Railroad Company, and are connected by a branch of that road with the main line at Laramie, and are generally known as the Union Pacific lakes. In these lakes the sulphate of soda occurs in two bodies or layers. The lower part, constituting the great bulk of the deposit, is a mass of crystals of a faint greenish color, mixed with a considerable amount of black, slimy mud. It is known as the "solid soda," and is said to have depth of some thirty or forty feet. Above this solid area occurs the superficial area of pure white crystallized sulphate of soda. This is formed by solution in water of the upper part of the lower body, the crystals being deposited by evaporation or by cooling, or by the two combined. A little rain in the spring and summer furnishes this water, besides which innumerable small, sluggish-flowing springs are present in all the lakes; but on account of the dry air of this region the surface is generally dry, or nearly so, and in midsummer the white clouds of efflorescent sulphate that are whirled up by the ever-blowing winds of Wyoming can be seen for miles. The layer of white sulphate is from three to twelve inches in thickness. When the crystals are removed, the part laid bare is soon replenished by a new crop.—*Popular Science Monthly.*