a subject so full of charms. It is not mere practical usefulness that entitles this or that production to our notice; the graceful and the beautiful have place in nature, prominent and unquestioned, and if we but listen a moment, we shall hear the pulsations of the inner heart that respond to them, beat for beat. And we shall do well to heed it, and not be angry with ourselves if, stealing a brief space now and then from sterner employments, we give ourselves to the contemplation and enjoyment of that generous and spiritual delight wherewith a bountiful Creator plainly designs to refresh the weary and jaded spirit. We cannot overlook mere beauty here, for the flowers tell us

"Uselessness divinest,
Of a use the finest,
Painteth us, the teachers of the end of use;
Travellers, weary eyed,
Bless us, far and wide;
Unto sick and prisoned thoughts we give sudden truce,
Not a poor town-window
Loves its sickliest planting,
But its wall speaks loftier truth than Babylonian vaunting."

THE BIRDS OF PALESTINE AND PANAMA COMPARED.

BY EDWARD D. COPE.

It is only lately that means of viewing any class of animals, which the Creator planted in the Holy Land, have been put at our disposal. As it is in the region which appears to have been selected as the first residence of man, an idea of superiority naturally attaches to its products; though we know, indeed, that all rich lands,—such as "flow with milk and honey,"—are prolific of the many outbirths of his manifold laws.

So little has this anciently known region been the field of scientific study, that, excepting among plants, our knowl-

edge has not approached completeness, until the publication of the late researches of Rev. H. B. Tristram.

Palestine, with its exceeding diversity of surface, its Carmel and Tabor, its Lebanon and Bashan, its plains, its deep quiet valleys, its rugged canõns and lake shores, presents scenes fitted for the habitation of all the forms where adaptation to nature must play a part; yet how different the inhabitants from those of similar situations in our own land, equally given to man for his habitation and place of development!

Tristram noticed 322 species of birds within the range of the ancient territory. Of these, 230 were land, and 92 water birds, *i.e.* Natatores and the wading Cursores. Of the 230, seventy-nine are common to the British Islands, and thirty-six of them are found in China, but a small proportion extending their range to both these extremes. Of the water birds, which are always more widely distributed, fifty-five of the ninety-two are British, and fifty-seven Chinese. Twenty-seven appear to be confined to Palestine and to the immediately adjacent country; the largest of these is a crow.

Taking the 230 land birds at a glance, we find the utter absence of so many of the well-known forms that enliven our grounds and forests. The absence of Tanagridæ (wood-warblers") and Icteridæ ("black- and hanging-bird" type) changes the aspect of the bird-fauna at once. What have we here, then, of nine-quilled Oscines to enliven the meadows like our swarms of blackbirds, or fill the tree-tops and thickets with flutter like our wood-warblers? Nothing; for the twenty-four species of finches, Fringillidæ, will but balance our own, though the genera are all different but four, and they the most weakly represented by species. We must look to the higher series, the ten-quilled song-birds, for the missing rank and file. While a much larger extent of the Eastern United States possesses fifty species of these types, the little Palestine has already furnished a list of one hundred and twenty-eight. First, of the crows which verge

nearest Icteridæ by the starlings, we have thirteen species against five in our district of the United States, and not less than seven of the type-genus Corvus, to one common and two rare. Two of the larger species, the ravens, gather with the vultures in the valleys of Hinnom and Jordan, and make the rocks of Zion resound with their coarse cries. If we turn to the cheerful larks, we find the proportion again the same; fifteen species for Palestine, and one for the whole United States. One congener of our species occurs there; the other genera call to mind the African deserts and Russian steppes. The Motacillidæ, again, are ten to one against our fauna, enlivening every run and puddle with their wagging tails and prying ways. We have two Tanagridæ to imitate them, besides the one true relative. In swallows we are about equal, and in the forest-hunting Paridæ—titmice and wrens—we exceed a little; but the comparison of Sylviidæ and Turdidæ is most striking. These highest of the bird series, especially made to gladden man's haunts, and cheer wild nature as well, with song, exceed in number all the other ten-quilled Oscines together inhabiting Palestine, amounting to seventy-five species. In our corresponding region of the United States, there are nineteen species. It is true no mocking-bird or wood-robin is known away from our shores, but Palestine has the nightingale, the black-cap, and the true warblers, or Sylvias, which, while they glean from shrub and tree their smallest insect enemies, as do our equally numerous small Tanagridæ, have much louder and sweeter voices. But the balance of distribution of organized types has more developmental and geological, than any other kind of significance.

Our solitary bluebird represents the long-winged Turdidæ; in the Holy Land there are twenty species corresponding, though none are of our genus. There are, indeed, but three genera of these two families common to both countries. One of these, Lanius, the butcher-bird, occurs here in one rare species, in Palestine in six.

Turning now to a lower series, we look in vain for Clamatorial perchers; that series which gives us the fierce kingbird and querulous pewee, and which peoples South America with thrush and warbler and shrike and tree-creeper. We are induced to ask, then, has the old world a period the start of the new? or were the respective countries to be forever stamped with the marks of rank and breeding. We cannot answer these questions now, but will see what other regions have to show.

In taking a hasty glance over the lower groups, in which the carotid arteries begin to be double, as the Syndactyli, we find Palestine too far from the tropics to present us with much array; but in the related Zygodactyles our forest-crowned continent must claim great preëminence. The oaks of Bashan and Cedars of Lebanon had but a solitary Picus to probe their wounds, while we have eight in the immediate neighborhood of latitude 40° in our Eastern States.

I will close with the birds of prey. Four swamp hawks, eleven species of falcons, four kites, and eight native eagles, form a list unequalled in the annals of nobility by any land. There are together thirty-one species of Falconidæ, and of vultures, four. The eagles appear to be all common; among them the most magnificent birds of prey, the imperial and golden species. How the flight of these creatures, soaring alike over the crags of Carmel or stagnant Dead Sea, or the towers of Jerusalem, calls to mind the spirits that have so often in this land pierced beyond the clouds of darkness of heart and bonds of human grovelling, and risen to contemplation of that glorious and all-powerful One, who created alike the mountain and the eagle.

To the ornithologist, acquainted with the fauna of North America, it will thus be readily perceived, that, in comparison, the bird-fauna just examined possesses more numerous representatives of the higher groups of the birds, and among lower groups, possess chiefly those of superior grade, or lacks them altogether. Let us, however, compare it with

that of another region, where varied surface and temperature offer even greater opportunity for variety within quite as restricted an area.

One of our early lessons that has to be unlearned is to the effect, that North and South America are separated by the Isthmus of Darien. This is in consequence of our natural later inquiry, Does this close approach of the two mighty oceans restrict the distribution of organized beings from region to region, or is it but a passage-way for the multitudes of the one side, into the far domains of the other? We can ask farther: Can such a narrow area support a variety of active existences? And again, in the cosmical view, Where in the scale of time's revelations do these beings stand? are they developments of the latest and newest creation? or have they any kin among those that are passing away?

The opening of the Aspinwall and Panama Railway has given us many a view into this forest-covered mountainous region. The vigor of the vegetable world presents a barrier to extended examination, little seen in more northern climes; hence less will meet the eye of the passing traveller than in a trip over an equal stretch of highway in the United States or Europe.

To those persons who with knife in hand have hewn their way through the Agaves that transfix the flesh, and the creepers that trip the feet, a world of life has been found; and this restricted region has been ascertained to abound with the forms which one would only expect to gather in a favored spot of some great continent. That nature can long hide from the eye of man will be evident, in view of the fact, that one of America's largest mammals, a beast related to the common tapir, has only come to light within a few months. I allude to the *Tapirus Bairdii*.

The bird-fauna has been found by Messrs. Sclater and Salvin to embrace about 385 species, which is sixty-three more than were mentioned to occur in Palestine, which is open on three sides to the great continent. Of these but

thirty-seven are water birds, Natatores and aquatic Cursores, showing that it is not the ocean that yields the abundance here. Of the 348 land birds, forty-four are characteristic of, or occur in North America, exclusive of Mexico, and 290 are of South American kin. We need not then hesitate to refer this region to the latter fauna, especially as we know many of the same species to be to some extent dwellers in Mexico. On this and other grounds we may safely add the thirty-six species which range from Mexico to the Isthmus as their *ultima thule* southward, to the evidence that this region is far within the frontiers of the Regio Neotropica.* Eighty of the 348 are familiar rangers of Central America, which have not spread farther towards the fields of the Montezumas; and those which find their kin limited to the Isthmus and adjoining regions of New Grenada and Equador, amount to about seventy-five more. Twenty-seven is the number not known to extend beyond the boundaries of Palestine; as to the Middle States of our Union, not one species has been shown to be restricted within such narrow limits.

A single species occurs in Europe; this is the fish-hawk, an animal which combines the cosmopolite habit of the sea-bird with the powerful flight of the bird of prey. This is also the only species common to the Panama and Palestine catalogues.

The birds of prey are numerous—twenty-nine species. Among these there is no true eagle or falcon, and of the nineteen genera, but four belong to the fauna of the Holy Land. There is but one species to represent the great grouse family, but instead, three *families* of their South American imitators, the Pullastræ, instead of the one, that of the pigeons, slimly represented in Palestine, and in North America as well. These Pullastræ are a generalized group, combining features of the perchers with those of the Rasores.

*One of the six great zoölogical regions of the earth, including South America, West Indies, and Mexico.

The Curassows are their largest modern type, while the Dodo represents our knowledge of the extinct forms.

The group of Struthions is also well represented by the various Tinamus. One of this group—the true ostrich—wanders over the borders of Palestine, but is scarcely an "Antachthon." He stands lower than the Tinamu.

Coming to the closer test of superiority, the Passeres,—those delicate creatures apparently so dependent on those laws which govern increase and provision, and so affected by the changes that man works in the face of nature; what do we find? Of the Clamatores, who least tune their voice to nature's harmonies, but rather imitate the fierce tones of the cruel, or the wild cries of the dwellers in the shades, we count 106 distinct species. There are none in Palestine. Of songsters, the Oscines, ninety-six species, await man's conquest of the wilderness to increase in numbers and to display their gifts, while Palestine rejoices in a whole army of them. But the contrast is remarkable if we analyze these forms. Of the Isthmus Oscines, seventeen only hold the first rank by virtue of their additional (the tenth primary) quill, while this feature marks 128 species of Palestine. As we rapidly follow the line to the point where its extreme is manifested, in the family of the thrushes, or Turdidæ, Panama is left but two solitary pioneers of these songsters of the north, while seventy-five species represent the family in Palestine.

We naturally inquire, Is there anything in the food, the vegetation, or the temperature, to account for this apparent diversity? Are there not seed-eaters, insectivores, and tree-climbers, where seeds and insects and forests grow the world over? We answer, undoubtedly there are, and these adaptations to food and climate are indeed as nothing in the general plan of creation, for every type of every age has performed these functions successively. Those which fill these places in the Isthmian and general neotropical bird-fauna, are the Clamatores already alluded to. Let us compare these with the Oscines, and see how complete is the parallel.

	CLAMATORES.	OSCINES.
I. Tree-climbers with long hind-toe and tail feathers stiffened.		
	Dendrocolaptidæ.	*Certhiidæ.*
II. Tree-perchers with hooked bill, graduating from powerful to medium and slender.		
	Formicariidæ.	*Turdidæ.*
	Thamnophilus, bill strongest,	*Lanius,**
	Formicarius, " moderate,	*Turdus,*†
	Formicivora, " weak,	*Sylvia,*‡
	Rhamphocœnus, " slender (wren's),	*Troglodytes.*§
III. Fly-catchers with flat bill and weak legs; wait for their prey and take it on the wing.		
	Tyrannidæ.	*Muscicapidæ.*
IV. Flat-billed berry and fruit eaters.		
	Cotingidæ.	*Bombycillidæ.*

So the subject might be pursued as it has been by others, and many parallels in greater details be drawn. Suffice it to say, that the same can be done for the frogs, the tortoises, the saurians, and to a great extent for the fishes of this same great fauna.

Now whether we call these types lower or higher, we find them to have spread in former ages over a far greater area of the earth's surface than at present. The writer has ascertained that many of the turtles of the Eastern Cretaceous period of our country are of this peculiar neotropical group, and that the species of the Eocene period of England (*Platemys Bowerbankii* and *Emys lævis*) really belong to the family Podocremididæ, now only known in the Amazon Basin. Another (*Platemys Bullockii*‖) really belongs to another family of the same series, the Sternothæridæ, now only known in Africa.

This brings us to another point. The whole Southern Hemisphere shares in the peculiarities of the South American or Neotropical fauna. Australia possesses a strange mixture of the old and the new; the clouds of the past floating in the sunlight of the future. South America, with newer mammals, has older reptiles, while to Africa comparatively few of the ancient landmarks remain.

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*Butcher-birds. †Thrushes. ‡Warblers. §Wrens.
‖Type of the genus *Digerrhum* Cope.

That these characteristics of the fauna mentioned are, in comparison with others, really successional, in the same manner as are different geologic epochs in relation to each other, can be proven by the study of the anatomy and development of the species of each. Their relative greater or less extension during the periods of geologic time also furnishes an indication of a chronic relation now existing between these faunæ. Thus we have before us some of the terms of that grand proposition, whose demonstration must ever be of high interest to mankind.

THE CHASMS OF THE COLORADO.

BY A. HYATT.

In Niagara we readily realize the power of demolition attributed to its waters. The Fall is still receding, the ground is shaken under us by its blows, the chasm it has cut yawns before our eyes. But it is another and far different matter to recognize the same force in other localities, where, perhaps, a puny stream, depleted by the summer heats, trails along the centre of some deep gorge.

Here the observer must remember that time has no boundaries in geology; that existing causes, provided they are capable of carrying away ever so small a portion of solid earth and rock now, would, in ages past, have had opportunity enough to have destroyed the whole of the rocky core which once filled the ravine.

Let him descend and look at the tottering pinnacles threatening him from above, and then examine those that have already fallen. The layers of the shattered masses are open to the ice-wedges in winter, the grinding and transporting power of the spring freshets, the alternate heat of noon and cold of night. Acted upon also by the oxygen of the air,