

limestones, sandstone, shales and conglomerate, were deposited. The crystalline rocks which have been examined, are thus brought into relation with the auriferous rocks of Nova Scotia. The syenites, (diorites and hornblende rocks?) are correlated with the granites; the argillites, serpentines and marbles with the argillites, quartzites, schists, and ironstones. Cape Breton is thus considered to have a greater extent of metamorphic lower Silurian rock than geologists have heretofore been disposed to concede to it, and of a character which may in no small measure compensate for the probable limitation of auriferous deposits.

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ART. II. ON THE EAGLES OF NOVA SCOTIA. BY J. BERNARD  
GILPIN, B. A., M. D., M. R. C. S.

(Read November 11, 1872.)

HAVING, in pursuing the subject of scutellation on the tarsi of rapacious birds, been led to examine many eagles lately in this Province, I have thought a short description of the known eagles inhabiting it would be acceptable to the Institute. Although we have a greater variety of Brown Eagles of various shades, or, as they are termed, Gray Eagles, than of any other colour, yet all that have come under my notice may be referred to two species and their young: the eagle of the old world, or the Golden Eagle, and the White-headed or American species. Although many of the brown ones resembled, and even excelled in size the Washington Eagle of Audubon, yet their bills and feet so exactly corresponded to the White or Bald Eagle, that I had to refer them to the young of that species.

*Aquila chrysaetos*, (Linn., Richardson, Sclayter.)

*Aquila canadensis*, (Linn., Baird.)

*Aquila fulva*, (Temminck.)

*Aquila antiquorum*, (Cuvier.)

Ring Eagle and Ring-tailed Eagle of Wilson and various European authors, being the young.

**This noble bird is rare in our Province ; perhaps six specimens may be all I have studied. The late Dr. VanBuskirk kept one in confinement several years. Mr. Downs had a pair trapped in the Eastern Counties. I saw two mounted specimens at St. John, N. B. ; and Mr. Egan mounted a very fine one, killed at Pictou by a woman. The adult bird is easily distinguished, and in the young the feathered tarsi, absence of scutellation on the tarsi, paler colour, and less robust, or as it were, less fatty look of legs and toes, distinguish it from the young of the bald. The most distinguishing mark in those I have seen was the prolongation of the loose feathers or hackles from the front and sides of the head to the shoulders. These, tipped with pale golden, and semi-erect, gave the bird a handsome crest, and added much to the intrepid look and stern eye, brow, and well curved, well hooked beak. The other parts were deep liver brown, the primaries black, and the shoulders rather lighter than the back. The tails had always more or less of yellowish white on the lower surface, making an indistinct crescent, its head towards the vent. In this they resembled Bewick's beautiful wood-cut of the Ring-tailed Eagle. The whole plumage was closer and finer than the bald's, the motion quicker, usually in short jumps, with less of that side to side walk, with head pushed forward, tail kept off the ground, and wagging, that the bald indulges in.**

**The young of this species are described by various authors as being more or less light ferruginous, with white marks and blotches upon the tail, which marks form a white crescent, but disappear with years. In Mr. Egan's specimen there was no white on the tail coverts, and none beneath, or any crescentic marks, but there was a little ash colour inside of the thighs. The one kept by Dr. VanBuskirk showed great ferocity. It attacked anybody approaching it, striking their legs and ancles with its talons. Unless you had a stout stick in your hand, your calfskin boot would soon be ripped from your ancles. This same bird pounced upon and seized a large tom-cat that was attracted under his perch by the fragments of meat dropped about, and immediately devoured it, paying not the slightest heed to its frantic cries and desperate contortions. In its aus-**

tere, intrepid eye and brow, with swelling and golden crest, it far exceeded the Bald Eagle.

Mr. Winton, who has taken a pair by trap, thinks they breed in the Eastern counties. The best ornithologists of the day consider this eagle common to the Northern parts of Europe, Asia and America, and under the name of Golden Eagle, to include the various synonyms of King and Ring-tailed Eagles, Fulvus Eagles, and Eagle of the Ancients.

### THE BALD EAGLE.

*Haliaeetus leucocephalus*, (Linn., Baird.)

This fine bird is common to the Province, and breeds in our secluded forests and rocky coasts. But it is so often seen in its immature plumage, in which it has been confounded not only with the last, but also with the Sea Eagle of Europe (*H. albicella*), that I think it best to study its various immature plumages before giving the adult. Systematic writers have also concluded that Audubon has not succeeded in making a true species of *H. washingtoniensis*, and that it is only the young of this species.

The prevailing colour of the smaller of a pair shot upon the grounds of Wm. Cunard, Esq., was dark sepia brown on back, head, neck, breast and lower parts; the brown a little lighter on shoulders, and still more so on the tail coverts, which were somewhat soiled or splotched with white; tail above dark brown, beneath the same, except the inner vanes, light brown, and the inside of the tail feathers becoming white as they entered the vent, which was also white. The long brown feathers covering the thigh had a little white. The chin and throat were white, well streaked with brown. All the loose feathers or hackles covering the neck, both back and front, were white inside, with black tips, but it was only on the front that the white showed through, the back showing brown. The primaries and secondaries were dark brown, and there was a good deal of white inside the wing, the bill bluish black, the cere yellow, and irides brownish. The bill was less rounded in its contour, shorter, and with less elongated hook than the adult. The legs were bright yellow, very robust, with a thick, fatty look. There

were five large scales upon the front of the tarsus, five upon the inside toe, thirteen upon the middle, eight upon the outside, and five upon the back one; the rest of the leg was reticulated or rather covered by roundish small scales. The claws were long, sharp and black, and the soles rough with warty protuberances. The mate of this bird, which was shot almost in the act of striking a peacock, and with the remains of a pullet in her stomach, was larger, and differed in having the tail coverts white, the tail on the under parts turning white, the body darker, and the bill turning yellow, with the beak elongating, and curve finer. Thus, here were two immature birds, the one a little advanced of the other in plumage and bill, mating together. In another specimen put up from a dead horse at Steele's Pond, I found the plumage a light clay brown, but otherwise resembling the others, the irides were brownish, bill black-horn colour, cere yellow. The very great size, the extended wing, nearly eight feet, the tail in the dried state fifteen inches and a half, and the whole bird three feet one inch, and exceeding an adult by six inches, (all these dimensions except the first being from the dried bird,) made me think I had found the lost *H. washingtoniensis*, but the bright yellow feet and robust talons, though differing slightly in their scutellation, so exactly correspond with those of the adult bald, that it left no doubt of its place. On the third moult, that is in the fourth year, these birds, though breeding in the second year, assume their adult plumage. The head, neck, and tail are now pure white, the other parts deep liver brown, with the edge of each feather paler, giving that fine imbricated look to the plumage. The bill has changed from bluish horn-black to bright yellow, its beak lengthened and contour rounded with a slight notch on the upper mandible, and the irides a wine yellow. The bright yellow robust legs and talons remain the same. This is the bird one meets not seldom on the rugged shores of the Bay of Fundy, perched upon a high overhanging dead pine. He boldly stands your approach, lazily floating away as a branch of the withered limb comes rattling down from his strong grasp. He is a fishing eagle, and always found upon the sea coast, or near waterfalls on the inland, though he will eat carrion.

I was riding one morning among the pleasant hills of St

Clements, when most protracted screams filled the air. Looking above I saw an osprey or fishing hawk loaded with a fine large fish, upon whose back a bald eagle was making stoop after stoop, soaring up after every strike and striking again. Presently the fish tumbled out of the osprey's claws and came skimming down flashing in the early slanting sun rays. The eagle folded his wings, dropped like lightning below the fish, and turning upon his back caught it, whilst the poor hawk disappeared screaming.

Though Wilson gives instances of this bird carrying off lambs, and in one instance a child, there are no traditions of such daring in this Province. His favorite food is fish; he strikes them alive, but will accept them dead; and we see him on this pursuit watching from a blasted pine the receding tide, or beating the long half dry flats of the Bay of Fundy. Our largest specimen was put up from a dead horse lying on the beach. They are usually in good condition, and no doubt the plenty of rich food, varied by hares, squirrels and grouse he obtains in the forest, prevents him from turning his yellow talons on lamb or child. They breed both on trees, and in rock cliffs. This last fact, verified by Mr. A. Downs, seeing them clinging to the cliffs in Grand Lake, is of note, as Mr. Audubon claims this as distinguishing his *washingtoniensis* from the balds. Though as long ago as Wilson, it has been determined that the brown eagles turn into balds in the fourth year, yet it is pleasing to verify it ourselves, to see the different colours mated together, or to watch them in confinement putting on the adult colours in the fourth year, as we have done in the gardens of Mr. Downs, and Mr. Leahy. As a sure test in determining our young specimens, and preventing them from being confounded together, or even with the *albicella* or Sea Eagle of Europe, which occurs in Greenland, (and a strong tempest driving one here may occur,) the scutella or large scales on the feet and toes are the best tests. The Golden Eagle has none on the legs, and about three on each toe, the bald eagle has usually five on the leg, five on the inner toe, from eleven to thirteen upon the middle, eight upon the outside, and five upon the behind toe. These vary especially upon the middle toe, and upon the leg; but a series of perhaps thirty gives this approximation. The greatest variation occurs upon the tarsi on the leg, and

though nearly every specimen has five lateral scales upon the front yet in some they are so small and obsolete, that they have to be looked for, whilst in others they are very large, and extend nearly to the joints of the front toes, as in Audubon's figure. This difference is especially to be noticed, because Audubon makes "scutellation on tarsi and toes continuous with their length," a specific mark of his great Brown Eagle *H. washingtoniensis*, and he figures it so in his great work. Subsequent writers as Cassin and Baird have denied that it can be so, and indeed one cannot get over the anatomical fact that no great scales can cover a joint, or that the hind toe, if even the three front ones might, would be incapable of a continuous scutellation; yet we have a satisfaction in showing, I think for the first time, a very marked approximation to Audubon's figure. As regards the other specific marks of the Washington eagle,—of his folded wing not reaching to the end of his tail,—of his nesting in cliffs instead of trees, our young balds possess them both.

16th June, 1873.—I examined a young bald. I supposed it to be about two weeks old. It was covered with thick yellow down. The primaries, secondaries, and tertiaries in pin feather, and about two inches long, were sepia brown with lighter tips. The spurious feathers were also showing. There were three or four dark spots on the back, and the tail feathers just showing, all the rest yellowish down. The legs were pale yellow; there were twelve scutellæ on the front of the tarsus, about twenty on the middle toe, and the back of the tarsus was also scutellated. The bill was yellow tipped with black on both mandibles, but the curve little developed and resembling that of the turkey buzzard. The length of the body from tip of bill to tail, eleven inches, and thigh and outstretched leg to toe eight inches.

This bird was sent me from Digby county by my son. The great development in number of the scutellæ and their appearance upon the back of the tarsus, in what may almost be called the embryo, and also the striking resemblance in the head and bill to the carrion buzzards, are both prominent facts in regarding scutellation as temporary and non-typical, and also in Agassiz's theory of the young resembling the next lower type.

In conclusion, I have met only two eagles inhabiting the Province, the Golden Eagle, the *aquila antiquorum*, the bird of Jove, of Cæsar, the type of the white, red, black, and double headed Teutonic family, and of the first Napoleon; the second or Bald Eagle, our great neighbour has adopted as their symbol.

We may say that the old world having first choice has the finer bird, yet a great maritime country is well symbolised by a Sea Eagle; and Nova Scotians may well say, glancing at our plundered fishing grounds—a fishing one.

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ART. III. THE GREAT AMERICAN DESERT. BY HENRY S. POOLE ESQ., F. G. S., &c., *Govt. Inspector of Mines.*

(*Read Jan. 18, 1878*)

A POPULAR lecturer recently speaking of the Great North-West referred to a map on the wall, and pointing to a great region of country which extends from the parallel of the north fork of the Platte River to the Sierra Nevada, and from the boundary line of British Territory to Mexico, spoke of it as the Great American Desert. To the immigrant pushing across the continent to the golden state, California, it formerly doubtless did seem to be all desert. For after leaving the rich loomy soil of Illinois and Iowa, and the rolling prairie of Nebraska, bright with many-colored flowers, he entered on a region which grew more and more desolate as he advanced towards its centre, and yet he seldom found any of it so poor but that it afforded sufficient nourishment for his cattle, and enabled him with their aid, after many weary months of incessant toil, to reach his destination.

But it is not to that immense region, now better known, and no longer spoken of as *the* desert, that I desire to draw your attention. It is merely to a portion of it that lies nearly in the centre, and forms but a small part of the whole of the country. Without doubt there are in the region referred to by the lecturer, besides the desert that is a desert beyond question, extensive tracts of most desolate and forbidding looking country, as equally ill adapted for cultivation as