

## THE COLORADO SPARROW HAWKS.

BY W. H. BERGTOLD.

IN a previous publication<sup>1</sup> I drew attention to the fact that in my estimation, the subspecific differences between the eastern and the western Crow break down in Colorado, and there cease to exist. The present study was undertaken and completed, to determine if a similar disappearance of subspecific differences occurred in the Sparrow Hawks of Colorado.

In 1892<sup>2</sup> Mearns reviewed the genus *Falco* and its species *sparverius* as found in this hemisphere, dividing the latter into three species and these into six subspecies. This arrangement still obtains in its main features, and is embodied substantially in the last 'Check-List' of the American Ornithologists' Union.

The present study deals with but two of the *sparverius* subspecies listed by Mearns, viz., *sparverius sparverius* and *sparverius phalaena*.

The material examined in this study consisted of twenty-six skins<sup>3</sup> all from Colorado, embracing specimens taken as early as 1872, and as late as 1925. The usual differential characters on which subspecies are based, were studied in these twenty-six skins, and it was found expedient to divide these characters into two main groups (a) mensural and (b) color and color-pattern; each of these major divisions was subdivided, the first (a) into measurements of (1) wing, (2) tarsus, (3) bill and (4) tail, and arbitrary numerical values given to each subdivision, while the second (b) was subdivided into the color and color-pattern of (1) wing, (2) crown, (3) back, (4) tail, (5) breast, (6) "face," and (7) throat, each of these subdivisions also being given an arbitrary numerical value. It is quite obvious that all these subdivisions are only an aid to making a general estimate of these characters; no claim is now made that such an arrangement or evaluation of characters is any better than others which might be devised. The method was

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<sup>1</sup> Auk, Apr. 1919, p. 198.

<sup>2</sup> Auk, July 1892, p. 252 et sq.

<sup>3</sup> I am greatly indebted, for the loan of skins, to A. H. Felger, Victor Hills, E. R. Warren, and Junius Henderson of the Museum of the University of Colorado.

adopted merely to enable me to fix, quantitatively, in mind, values assumed for the characters, to help make tabulations of the same, and to aid me to evaluate the sum totals of the characters as they leaned to one, or the other subspecies.

The arrangement *seemed* to me to eliminate as much as possible the personal equation always inherent in every consideration of color.

One bar to a completely satisfactory study of the question now in hand was the unavoidable lack of specimens from the extreme eastern border of the state, an area into which, it would seem reasonable to expect, pure *F. s. sparverius* should drift from Kansas and Nebraska, and interbreed with whatever subspecies exists in Colorado.

Twenty-five of the skins examined were collected in Colorado west of a north-and-south line drawn through Colorado Springs, a single skin only coming from a part of the State east of Colorado Springs, to-wit a specimen from Masters, Colorado, a point about one hundred and fifteen miles from the Colorado-Kansas line. Nineteen of these twenty-six Sparrowhawks were collected between the Colorado Springs line and the eastern foothills (the western edge of the great plains), three from the western slope of the state, and finally three from localities well within the mountains, all of which last locations are above 7500 feet altitude.

Mearns had but seven skins from Colorado amongst the many he studied, and did not mention the locality or localities in Colorado whence these seven skins came; hence it is now impossible to compare the data from his Colorado specimens with those gathered from the twenty-six skins studied by myself. It seems that typical specimens of *Falco sparverius plalaena* were found by Mearns to exist in greatest abundance in the "treeless south-west," a fact which reasonably would lead one to believe that Colorado also might have a goodly number of its Sparrow Hawks attributable to this subspecies because the eastern half of the State, portions of its south-west, and also areas such as the lower reaches of the Grand, and White, and Bear Rivers are more or less "treeless." The contrary conditions existing in the mountains ought to cause the Sparrow Hawks of such areas to depart more or less widely from *F. s. plalaena* and to grade into *F. s. sparverius*, because the sub-

genus *Cerchneis* is as variable throughout its range as is the genus *Otocoris*. Judged by the value of their *metrical characters alone*, twelve of the specimens used in this study proved 100% *F. s. phalaena*, four of which came from Denver, three from El Paso County, and one from each of the following localities, to-wit Boulder, Barr, Hot Sulphur Springs, and Yampa; an examination of this list of locations gives no hint of any relation of area to its subspecies, the skins came from the plains and too, from the high areas on the western slope of the State. Six of the twenty-six skins studied exhibited only 75% *F. s. phalaena* mensural characters, two of these six skins coming from Denver, two from Boulder, and one each from Meeker, and Ignacio, and yet again with these six specimens there was found no relation between the subspecific metrical characters and the area of collection. Five of all the skins used in this study showed but 50% *F. s. phalaena* mensural characters, three coming from Denver, and two from Boulder. Finally a skin from Meeker proved on examination to have but 25% *phalaena* metrical characteristics. It seems quite patent from the data gathered in this study that no one can predict correctly what percent of mensural characters relating to subspecific nature will be found in any given specimen from any given locality in Colorado, and it is equally obvious that there is an extraordinarily wide variation in the measurements of Colorado Sparrow Hawks.

A previous<sup>1</sup> study convinced me that the wing measurement is more valuable as a differential character than any other, in fact exceeds in such value the combined worth of the wing, tarsus and tail measurements. Assuming this to be true, and then using the wing measurements of the skins under consideration in the present study it appears that nineteen of the twenty-six specimens would have to be classed as *F. s. phalaena*, and six as *F. s. sparverius*. It seems to me that great weight should be given to metrical characters for it is highly probable that "in nature" they are far more stable than are color and color-pattern; if this be true one is safe

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<sup>1</sup> Condor, March-April 1925, p. 59.

<sup>2</sup> Incidentally it can be noted here that this study revealed quite unexpectedly to me marked differences in the lengths of the right and the left wings in several of these twenty-six skins, one showing a difference of twelve millimeters between the two wings.

in holding that both *Falco sparverius sparverius* and *F. s. phalaena* occur in Colorado when decided by the data here gathered. It therefore becomes necessary to add *Falco sparverius sparverius* to the list of Colorado birds since the A.O.U. 'Check-List' does not include Colorado in its description of the range of subspecies *sparverius*, because, so far as I know, the subspecific status of Colorado's Sparrow Hawks has never before been definitely determined and because the Sparrow Hawks of this State have been reported in the past as of subspecies *phalaena*. It is quite probable that some of the specimens utilized in this study would show a far greater approach to, or even identity with, subspecies *sparverius* or subspecies *phalaena* if Mearns has given the maximum and minimum measurements of single skins, which in his estimation were typical of either of these two subspecies.

Subspecific characters as indicated by color and color-pattern do not run parallel with those of measurements in Colorado Sparrow Hawks; a given specimen may lean far towards one subspecies in its metrical characters, and quite the other way in color. On the other hand a specimen may show strong tendencies both in measurements and color towards one or the other of the two subspecies we are considering. The actual findings are extremely variable and unexpected; thus a skin from Meeker is approximately 70% *F. s. sparverius* in its combined mensural and color characters, while a specimen from Denver exhibits 100% *F. s. phalaena* characters in its metrical aspect and 57% color and color-pattern characters of this subspecies. The color and color pattern characteristics of subspecies *phalaena* expressed in percent ran from 36% in a skin from Meeker to 93% in one from El Paso County. There is no relation discernable, in this series of skins, between collection locality and the per cent of subspecific color character; thus of two skins from El Paso County one is 93% and the other 57% in *F. s. phalaena* color characteristics, while two from Denver are 70% and 36% respectively. Neither is there any correlation between the altitude of the place of collection and the percent value of the color characters; a skin from Yampa (alt. approx. 7900 feet) gives 86% in *F. s. phalaena* color characters, and yet one from Denver (alt. 5200 feet) gives nearly as much, viz., 70%, and yet again another skin from Denver gives but 36%. While many

of the skins examined showed decided leanings towards the desert subspecies [*phalaena*] many others gave striking confirmation of the truth of the statement made many years ago by Mearns<sup>1</sup> that "a number [of skins] from Colorado are too near *sparverius* for reference to this form," meaning I take it, that the skins in question could be referred neither to one or to the other of the two subspecies under consideration.

One would expect the Sparrow Hawks of the relatively dry regions in Colorado between the Rocky Mountains and the Kansas-Nebraska line to show a decided tendency to be (or become) subspecies *phalaena*, but careful study uncovered to me no such bias at all, and did show that there was no rule as to the locality of collection and the color of the specimen.

The combinations of metrical and color values in the skins utilized in this investigation are so varied that one gives up trying to get rhyme or reason or order into them. One thing stands out with striking boldness, the extreme variability of species *Falco sparverius*, a condition long ago emphasized by Mearns.

I am convinced by my study of the material in hand, that amongst the twenty-six skins not one is truly *typical* of either subspecies *sparverius* or subspecies *phalaena*. However five specimens in their combined mensural and color characters are over 90% subspecies *phalaena*, and three are over 70% subspecies *sparverius*, the first group embracing skins from Barr, Denver, Yampa, and El Paso County, and the second specimens from Boulder, Denver, and Meeker. Therefore, if I have not erred, and have estimated correctly the values of the characters of the material studies it must again be said that under our present classification both *Falco sparverius sparverius* and *F. s. phalaena* occur in Colorado.

However it seems quite obvious that Colorado Sparrow Hawks are, so far as the material examined by me goes, not *absolutely* characteristic of either of the two subspecies here under consideration; this is substantiated by Mearns who said<sup>2</sup> when mentioning the birds from Colorado, that "these differences are of so slight a character as to be insusceptible of intelligent expression in written descriptions in the majority of cases," words I can most heartily

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<sup>1</sup> Auk, July, 1892, p. 266.

<sup>2</sup> Auk, 1892, p. 258.

endorse. This brings about a situation of unusual interest, and points to another of much importance when viewed in the light of present day ornithological classification and nomenclature. These indefinable specimens undoubtedly exist, as recognized so long ago by Mearns, but what shall be done with them systematically? Shall this subspecific indeterminability be disregarded and such border-line groups be ignored? Or shall further subspecies be erected to include them? Or must it be admitted frankly that with these indefinable specimens the present classification breaks down in so far as it relates to many subspecies? I cannot see any alternative to admitting freely that the last is the only and the most logical one. Now if the present difficulty were an isolated instance and the only one in my experience I would be exceedingly wary in assuming such a position, but the choice becomes much easier for me when I recall that the same artificial sharp division into subspecies breaks down with Colorado Crows. Furthermore one does not need to *collect* Robins in Colorado to determine the status of their subspecific relations; the merest novice after studying our Robins in the field during the migration and breeding seasons will learn promptly that there is every possible gradation between typical eastern birds (*Planesticus migratorius migratorius*) and typical western birds (*Planesticus migratorius propinquus*) in the color and the color-pattern of these local Robins. There is no doubt whatsoever in my mind but that a similar, and comparable gradation would be found in many other species whose subspecies overlap in Colorado. No one appreciates more fully than I do the need and wisdom of recognizing and *describing geographical variations*, but it seems to me that some systemists have been, and are, too eager to use such variations as justification in erecting a multiplicity of subspecies which often the very originator of the subspecies cannot recognize unless he knows the locality whence the specimen comes. This last statement is not based on a fancy, but on cold experience. If the original describer of a subspecies cannot recognize the child of his discernment or imagination without the hint of a locality label, how is an ordinary ornithologist to diagnose such a specimen? Has it not come to the point where some zoologists in their honest but unbalanced zeal have made a fetish of the establishment of subspecies and have long lost a due

sense of proportion, mistaking the appearance of an entity for the actual thing? Is it not possible to recognize and describe the extremes found with a given species, and the intergrades between such extremes without endlessly adding such minutely separated geographical variations, as subspecies to an already overburdened check-list? Has not the time come when a decision must be made as to whether or not workers in zoology are to continue making an endless series of subspecies based on increasingly minute, and at times unrecognizable, differences?

*1159 Race St., Denver, Colo.*

[Dr. Bergtold's paper illustrates so well the present day confusion of ideas regarding subspecies that a few words as to their nature and utility and their place in our Check-List would seem to be in order,<sup>1</sup> even though the subject has been very thoroughly discussed in the past. His paper is divisible into two parts: (1) a demonstration of the irregular variability of Sparrow Hawks in Colorado, and (2) a denunciation of finely drawn subspecies in general and a demand for their suppression.

As to the first of these, granting all that Dr. Bergtold has said regarding variability, percentages, etc., the fact that Sparrow Hawks vary in many perplexing ways in Colorado in no reason why we should reject the division of the species into eastern and western races providing the birds east and west of Colorado maintain the differences accredited to them. When a wide-spread species begins to break up into geographic forms there are areas of intergradation where one form merges into the next, and these areas of intergradation may be narrow, in which case the vast majority of individuals in the combined ranges may be definitely referred to one race or the other; or broad, when individuals over a considerable area cannot be so referred. Dr. Bergtold, if his interpretations are correct, has given us an excellent example of the latter condition. If one wishes to label all of his specimens sub-specifically he is of course unfortunate if he lives in a *broad* area of intergradation. But is it not just as interesting and important to work out the endless ways in which nature has combined the characters of the two forms in the region where they merge one into

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<sup>1</sup> See also comments in 'Recent Literature,' beyond.

the other? After all both specific and subspecific nomenclature are only our more or less inadequate way of indicating definitely what nature is doing, often in anything but a definite manner. Whether another student of the subject, with Dr. Bergtold's twenty-six skins in hand, would reach the same conclusions as he has, it is hard to say, without the detailed facts before us. Variation with respect to age, the relative importance of variation in the two sexes and in different seasons are all important factors upon which he is silent as also the exact relative value given to the different measurements and the coloration of different areas.

(2) The plea with which he ends his paper as to whether the time has not come when a decision must be made as to whether workers are to continue making an endless series of finely drawn subspecies, can hardly be taken seriously. We cannot stop the publication of new subspecies. Everyone has a right to publish what he pleases in this line of research and it is being done everywhere. At the present time in botany, entomology, conchology, mammalogy, ichthyology, etc., and in every country of the civilized world, from Japan to South Africa and Argentina systematists are busily engaged in separating out geographic forms, often on very minute characters, with the object of furnishing the materials for studies of variation, effect of environment, inheritance, zoogeography, etc. This is what subspecies are for.

Yet in these other scientific fields no one rises up to call for a check on the activity of the systematist as is so often done in ornithology. This is apparently because there are in these sciences no great armies of students engaged in the study of habits, behaviour and other phases of field work, and why is the ornithological systematist to be halted simply because his science is blessed with a wider field of activity than is that of the botanist, ichthyologist, etc.

The designation of geographic forms in all these fields, including ornithology, is for use in working out the problems above referred to. Subspecies are not intended for the use of the general observer of birds, the student of life history, of nesting habits, etc. His lines of investigation, while of fully equal importance, do not require the use of subspecies. It has often been asked "How is the 'ordinary ornithologist' to diagnose these finely cut sub-

species?" but why should he be expected to diagnose them? The general medical practitioner of today does not attempt to diagnose a difficult case, but refers it at once to a specialist, and the specialist in ornithological speciation thoroughly trained in the work is able to perceive many things that the 'ordinary ornithologist' cannot, and can distinguish races with ease which appear to the latter to be inseparable.

The claim is made that while there is no objection to the specialist studying and describing minute variations they should not be named nor placed in our 'Check-List'. But who is to be the judge of what to put into a 'Check-List' and what to leave out? The minute we begin to reject subspecies upon grounds of insufficient differences we get entangled in the meshes of individual opinion. Those who believe in the validity of the forms in question will go on using them and those who look up these same forms in the 'Check-List' and fail to find them will blame the authors!

It would seem best therefore to admit all properly worked-out subspecies in our 'Check-List' on their merits so that those interested in subspecific differentiation can find them, while those to whose work subspecies do not apply may fall back upon the binomial name. Doubtless some subspecies will not stand the test of time and variations supposed to be racial will prove to be individual, but in all investigations the *entire range* of the form must be considered not merely the region of intergradation. There has been no way suggested as yet indicating geographic variations except by the use of the trinomials and until some generally adopted method is available we shall gain nothing by flying in the face of the rest of the scientific world in rejecting the present method, except a reputation for provincialism.

There is one more point that seems to have been lost sight of by the opponents of the "subspecies" and that is that a subspecies is not distinguished from a species by degree of difference. On the contrary intergradation is the criterion of the subspecies. If two geographic forms are still connected by an area of intergradation in which intermediates occur they are subspecies; but if the intermediates have disappeared and the two forms are completely distinct they are species. It, however, often happens that there are species that are far more difficult to distinguish from one

another than many subspecies are, as for instance the species of small Flycatchers of the genus *Empidonax*; while on the other hand there are subspecies which are so different from one another that any one can distinguish them, such as the great Song Sparrows of Alaska or the Desert Song Sparrow of southern California.

Consequently in popular works where the object is to present all of the *kinds* of birds that the 'ordinary ornithologist' can distinguish it would seem that we must go along on the principle of degree of difference and ignore the problem of intergradation, entering in the work some trinomial forms among the prevalent binomials. By dropping all subspecies, and hewing strictly to the binomial line as has been sometimes done we drop a number of very distinct forms which we cannot afford to ignore. It would indeed seem quite within reason to publish a "field student's check-list" on this plan, allowing the regular A. O. U. 'Check-List' to cover the entire field in all the technical detail as at present. The writer has no desire to start arguments on this subject, which experience has shown are endless, but merely to present some suggestions for what they may be worth.—WITMER STONE.]