

recognized as the Tufted Titmouse. I heard intermittently for about a quarter of an hour the series of notes, which sound like *pêtel-you, pêtel-you, pêtel-you*, but did not succeed in getting sight of the singer. Wishing to confirm what I considered a rare find for Long Island, I returned the next day. The bird was still there and singing, and without much trouble, by imitating the song, I coaxed him out of the thicket into plain sight. No doubt existed in my mind as to the identification, as I am familiar with the songs of the bird and its appearance in life. Giraud in his 'Birds of Long Island' (1844), wrote as though *Parus bicolor* were common at that time. It is also included in Lawrence's 'List.' But one specimen, bearing no date, is extant in the Long Island Historical Society's collection (Dutcher, Auk, X, 1893, p. 277). I consider it a very rare straggler on Long Island.

INDIVIDUAL, SEASONAL, AND GEOGRAPHICAL
VARIATIONS OF THE AMERICAN GOLD-
FINCH (*ASTRAGALINUS TRISTIS*).

BY JONATHAN DWIGHT, JR., M. D.

LINES of least resistance are those most naturally followed, and there is perhaps no line of ornithological investigation easier than discovering differences of color and size that can always be seen in series of skins laid out before our eyes. But, heretofore, the tendency has been to look for geographical variations, and consequently almost every North American species has been gradually split up into geographical races as fast as enough specimens from one part of the country have been gathered for comparison with those from another. Major differences have already been recognized and we now seem to be fast approaching a point where individual variation is likely to prove greater than the minor differences, that pass as subspecific characters. When these consist only of slight variations in depth of color and millimeter differences in dimension, it is indeed a wise describer that knows his own race when the labels of locality are removed. My contention is that unless these geographical variations are appreciably greater than those common to the species there is small reason for 'splitting,' however much this may redound to the describer. I believe, too,

that a better understanding of individual and seasonal variation in recognized species will do much to remedy a growing evil that, whatever its cause, is greatly to be deplored. If, eventually it becomes both necessary and proper to recognize by a name every minor variation due to environment, it seems desirable, first of all, to learn how much of it is individual and how much seasonal, so that the value of the geographical element remaining may be better characterized. This is no simple matter, but one involving more tedious comparisons of plumages and measurements than are required in the mere naming of races.

In order to show how great may be the variation in a single species, I have selected the American Goldfinch (*Astragalinus tristis*) as being peculiarly suitable for the purpose. It is widely distributed over North America, and being to a certain extent resident wherever found, its races, of which two have been described, ought to show marked characters, while individual variation ought to be very little. This does not seem to be the case, for the subspecific characters are slight, while individuals differ widely in both color and size. The seasonal variation in plumage is considerable, there being no less than six plumages easily recognizable in the male, and although most of the feathers are renewed by moult twice in the year they are subject to a large amount of fading and actual loss of substance.

The two geographical forms are *pallidus*, a large pale bird from Arizona described by Dr. Mearns (Auk, VII, 1890, p. 244), and *salicamans*, a small dark bird from southern California described by Mr. Grinnell (Auk, XIV, 1897, p. 397). A small series of *pallidus*, including the type, has been available at the American Museum of Natural History and Mr. Grinnell has kindly loaned me a series of eighty specimens of *salicamans*. These have been compared, plumage by plumage, with over one hundred specimens of *tristis* in my own collection. The variations in dimensions have been tabulated, and those of color may be found under the different plumages, which I have designated in numerical sequence.

Several new facts are brought to light by the study of this material. It appears that adults have, on an average, appreciably longer wings and tails than young birds and that each loses in the course of a year through wear an appreciable amount of this

length, the loss being greatest in young birds. These facts are true of other species than the Goldfinch, and their importance is obvious if races are to be established on minute differences of dimension; for if by any chance a series of young birds, for instance, should be compared with adults of a supposed new form, the differences in the new form would be magnified out of proportion to their value. Furthermore the element of wear complicates the question unless absolutely comparable series of equally worn birds are available. True, these differences are extremely small and only to be made out by average measurements of series, but it is on just such small variations that races are now founded, hence the need for a better understanding of seasonal variation in dimension.

Seasonal variation in color is due to moult and subsequent fading of the plumage. Probably no colors are more susceptible to fading than the browns and the buffs, and therefore the Goldfinch, particularly in winter dress, varies between wide extremes on the Atlantic coast, but fades less on the Pacific. Specimens show that *tristis* and *salicamans* are equally brown after the postnuptial moult, the drier, brighter climate in the East fading *tristis* quite rapidly in the subsequent months, while *salicamans* remains dark. This may well raise the interesting question whether geographical races may be separated on mere fading. It seems to me they should be independent of accidents of moisture and sunlight, otherwise an unusually wet or dry season anywhere would produce temporarily a dark or a light race, as the case might be. The evidences of climatic influences ought to be found in fresh plumages if they are to be of any value. It is unfortunate that the type of *salicamans*, taken December 21, should be a more or less faded winter bird, for individual differences in plumage are greater in the brown winter dress than in the more stable yellow of the summer months.

The earlier moult of western birds is a matter that has never been considered in its possible bearing upon the fading of plumage. The series of *salicamans* shows that the moults of the California bird take place a month or two earlier than in eastern *tristis*. Comparable birds in fresh plumage are therefore naturally September *salicamans* with November *tristis* and, except for the evidences of fading which survive the prenuptial moult, average March *salic-*

camans with *May tristis*. Another interesting fact in connection with the feather changes of *salicamans* is the more limited prenuptial moult. While in *tristis* this involves almost the entire body plumage, in *salicamans* it frequently stops short of the renewal of feathers at a number of points, so that the persistent old feathers, especially in females, tend to produce a brownness that is lacking in the yellower eastern birds.

Having thus briefly reviewed some of the salient features that should be considered in studying variation, we may now examine at some length the details of plumage and the plumage changes in the Goldfinch.

1. *Natal Plumage.*—This ephemeral first stage of plumage is largely acquired before the chick is hatched and consists of a few long downy filaments known as neossoptiles. It would be interesting to make comparison of geographical races at this early period, but material of this sort is sadly lacking. The neossoptiles are in direct continuity with the feathers of the next generation and are lost, even before the nest is deserted, through the postnatal moult.

2. *Juvenal Plumage.*—This is commonly known as the nestling or 'first' plumage. It develops rapidly; the chin and sides of head being the last areas to be clothed, and the body feathers are worn but a short time before they are replaced through the postjuvenal moult. The feathers of this second stage have been called mesoptiles, in distinction to those of later generations which are known as teleoptiles. In males of *tristis* the upper parts are uniformly bistre, shaded with deep wood-brown, and generally there is a faint greenish or yellowish tinge. The abdomen is primrose-yellow; breast, sides, and crissum washed with ochraceous-buff. The chin, throat and supraloral region are pale olive-yellow of varying intensity and extent. The wings and tail are black; the wing-coverts, tertiaries and secondaries broadly edged with ochraceous-buff or clay-color, the edgings forming two wing bands at tips of greater and median coverts, the distal feathers being whiter. Several primaries are basally white, the spot showing beyond the primary coverts. The terminal third of each rectrix is dull white on the inner web.

Aside from variation in the original depth of the browns and

buffs, the shade of these colors depends much upon the length of time the plumage has been worn. In the vicinity of New York birds are not on the wing before August or September, depending upon the hatching of the individual, and this plumage is worn until the end of October or the beginning of November. The female is similar to the male, but the wings and tail are of a duller black, the tail blotches brownish white and in no contrast to the dark parts of the webs, and the yellow tinge of the lower surface is less distinct, restricted to the chin or lacking. A few deep-colored females cannot be distinguished from the duller males. In matters of dimension, the tarsi and toes quickly reach their full size, followed by the wings and tail, while the bill is of slower growth. The average dimensions are somewhat smaller than in adults a year or more older.

I have seen no specimens of *pallidus* in this plumage.

The young of both sexes of *salicamans* in this plumage are not darker than eastern birds at a corresponding stage, but they are usually more suffused with yellow, especially below. Specimens from the end of May to the end of August, are comparable with September to November *tristis*, on account of the difference in the hatching season of eastern and western birds. The wing-edgings of *salicamans* are scarcely, if any, broader on an average than are those of *tristis*, and their color is identical. Females of course average duller than males. Individual variation and fading are, however, responsible for greater differences than may be satisfactorily established between the two races, for when eastern and western specimens are mixed together it is impossible to separate even a majority of them without looking at their labels.

3. *First Winter Plumage.*—In *tristis* a partial postjuvenile moult, confined to the body and the lesser (rarely the median) wing-coverts, takes place during September or October. The wings and tail are not renewed and their edgings, through rapid fading, become a pale buff even before the moult is completed.

In males the new brown of the upper parts is deeper than that of the juvenal plumage and strongly suffused with olive-yellow on the head, often faintly tinged elsewhere, and there is a grayish collar visible on the neck; the upper tail-coverts are smoky gray with wood-brown edgings; sometimes the rump is tinged with

yellow and sometimes not. Above, the plumage, although much darker, resembles the juvenal, while below it is much paler than the juvenal, the abdomen and crissum being dull white, the breast a brownish olive-gray and the sides and flanks strongly washed with wood-brown, while the yellow of the throat is brighter and more extended. Some specimens, however, are everywhere suffused with yellow, which extends further on the breast, and are hardly to be distinguished from adults, except by the lesser coverts, which are dull black with olive-yellow or greenish edgings. In adults these coverts are chiefly canary-yellow.

The browns and buffs fade so rapidly that in a few months the upper surface usually changes from a deep sepia to a pale hair-brown, the unprotected wing-edgings bleach nearly to white, and the wash on the sides becomes scarcely perceptible. The wing-edgings pale earlier than the back or sides where the feathers are newer, usually becoming white, often by the end of January, while the brown of the back does not become decidedly grayish until April. A few resistant April birds are found, however, that are almost as brown as November specimens, and birds taken on the same day during the winter months will vary widely in tone, owing no doubt both to the different periods at which their plumages were assumed and to individual variation in original color and in resistance to exposure.

This plumage is worn for about five or six months, and although the beginning of the prenuptial moult is seen sometimes as early as the end of January, it is usually the end of March or beginning of April before the feather-tracts show much activity. The gradual creeping in of new feathers is perhaps most conspicuous on the head, but it occurs at all of the customary points of outbreak as outlined in my earlier papers on moult.

In the female of *tristis* a partial postjuvenal moult takes place, as in the male, from which the female is distinguishable chiefly by the retained dull wings and tail of the juvenal dress. The yellow of the new feathers on the chin is duller than in the male and restricted to a smaller area, less often suffusing the head or adjacent parts. The browns are a trifle duller. The lesser wing-coverts often remain brown or assume only a faint greenish tinge. Otherwise females resemble males during the winter, their pre-

nuptial moult occurring somewhat later than in males and being as a rule less extensive.

The series of *salicamans* contains no bird in freshly acquired winter plumage although some end of August specimens, still in juvenal dress, show a few new feathers. This indicates an earlier postjuvenal moult in the California bird, just as a specimen of January 9 indicates an earlier prenuptial moult. This bird is already yellowish from an admixture of new nuptial feathers and has lost much of the buff of the wing-edgings through fading. Six specimens of the equivocal date "3/1/97" have also begun the prenuptial moult but are grayer and more worn, a good part of the edgings having disappeared. Specimens of February 6 and March 23, scarcely differ from the January bird except that the nuptial black and yellow is well advanced. The January bird is absolutely indistinguishable from the yellower January specimens of *tristis*, and the March *salicamans* are the counterparts of the browner March and April specimens of *tristis*. Comparable specimens of *tristis*, owing to the later moults, ought to be those of a month or two later than specimens of *salicamans*, if both forms faded at the same rate. This does not seem to be the case, for *salicamans* from January to March appears to fade very little, whereas *tristis* usually becomes much grayer in a like time. Still it is perfectly possible to pick out a light and a dark series of *tristis* in any winter month that will show more constant average differences than winter *salicamans* does from *tristis*. It might be said a first winter *salicamans*, on account of yellowishness, most resembles a second winter *tristis*, but there are many exceptions, and the differences are really extremely slender. Females show these variations as well as males, *salicamans*, between December and March, fading less than *tristis* in like period, and the difference is noticeable chiefly in the browner sides and flanks of *salicamans*. Eastern and western birds therefore may be said to acquire at the time of moult plumages of the same color which vary later through fading alone. It is unfortunate that a male taken December 21, should have been selected as the type of *salicamans*. The bird is probably like the January 9 specimen, a faded first winter plumage, because the lesser coverts are described as 'olive-green.' Types ought to be fresh-plumaged birds.

A few specimens of *pallidus*, chiefly females, do not permit of very definite conclusions.

4. *First Nuptial Plumage.* — In *tristis* the prenuptial moult of males is generally completed early in May, being confined to the body feathers. The new plumage is canary-yellow with a black cap. The wings and tail are left over from the juvenal stage, while a few tail-coverts, abdominal and crural feathers, together with the lesser wing-coverts (sometimes however renewed at this moult), remain of the first winter dress. Thus, the first nuptial is really made up of parts of three plumages. It is worn four or five months and only towards the end of this period do the ravages of feather disintegration or abrasion become very marked. The edgings of the juvenal feathers gradually disappear leaving the wings and tail black except for the white tips of the secondaries. The remiges and rectrices themselves become more or less ragged; those of young birds being less resistant to wear than those of adults. The tables of measurements show that wings and tail through a year's wear lose about 3% or 4% in their length. As the actual breeding season, in July and August, advances, the yellow plumage acquires a greenish or citron-yellow tint, due in part apparently to the exposure of some of the grayish basal portions of the feathers. The yellow itself fades little if any.

In the female of *tristis* the prenuptial moult is not as extensive as in the male, less often extending to the abdomen and rump, and occurring a few days later in the spring. There is no black cap, and the lower parts, with sides of head and rump, are citron-yellow, brownish tinged on the sides, and becoming a brown tinged olive-green on the back.

The prenuptial moult of *salicamans* differs from that of *tristis* in two important particulars. In the first place, it occurs earlier by fully a month or more, and in the second, it is on an average much less extensive. As a result of the limited moult males often retain the brownish feathers of the winter dress, at points where they are completely renewed by yellow ones in *tristis*, while females retain many more old feathers than do the males. Consequently the yellow of males is obscured, especially on the nape, scapulars, rump and flanks, by the mixture of old and new feathers that give a dark or greenish effect, while in females the much

greater number of old feathers retained makes them appear darker and browner than eastern *tristis*. The less faded sides also enhance the dark effect. A large series of both sexes shows this clearly, and on account of the preponderance of old feathers in females they suffer far more from wear than do females of *tristis*. Both males and females of *salicamans* therefore usually become more worn than *tristis* in summer or breeding dress; and furthermore, in comparing specimens, allowance must be made for the earlier acquisition of this plumage in *salicamans*. Consequently a series of *salicamans* taken late in May are comparable to July or August birds from the East. The prenuptial moult in each form is practically completed a couple of months earlier than these respective dates, although the moult lags in the California bird, as it is wont to do in birds of a warm climate. There seems to be no real difference in the yellow of the two races except that possibly on an average there is a shade more of depth in *salicamans*, just as there is a yellower tone in other plumages. It is *salicamans* that has the yellower and *tristis* the greener tinge when perceptible, but the shade of difference is so slight and so inconstant that only in large series is it possible to recognize it. The black cap in *salicamans* seems to average smaller and is more variable in extent. Two specimens have only a few black feathers, the rest of the head being yellow, a condition not contingent on the extent of the moult, which evidently has been fairly complete. No *tristis* approaches these birds, although the black cap is diminished in size through wear.

I have seen no specimens of *pallidus* in first nuptial dress.

5. *Second Winter Plumage.*— Both sexes in all forms of the Goldfinch undergo a complete postnuptial moult which in *tristis* occurs in September or October. The first signs may appear in males as early as the second week in September, and it is usually completed by the middle of October or first of November. The whole plumage averages richer in color than that of the first winter, with a yellower suffusion, especially of the head and rump, the browns are deeper, and the wings and tail blacker. The outer greater coverts are whiter and the white spot at the base of the primaries, if present at all, is much reduced, not showing beyond the primary coverts. But the only constant differential plumage

character by which adult males may be distinguished from young males is found in the lesser coverts or 'shoulders' which with the median coverts are bright canary-yellow. In some specimens the lesser coverts are greenish tinged, being dusky basally, and there is much white in the median coverts. Such birds usually show a white spot on the primaries, while the yellower-shouldered birds do not, but whether they represent the second winter and the others the third or later winter plumages, I cannot say. Osteological characters show that none of these are of the first winter, although some resemble very closely bright colored young birds. The same influences of wear produce the same effects in adults as in young birds, bleaching them rapidly during the winter months. There is great variation in winter specimens, whether of the first or later winters, also there are age variations from winter to winter, and the individual resistance to fading varies, but all these variations so overlap that it is hardly possible even with large series to establish which of them has been most potent in any given case. At about the same time as in young birds, or usually a little earlier, the second winter dress begins to be replaced by the second nuptial.

The postnuptial moult in the female occurs a little later than in the male who is not occupied so long in caring for the brood. The differences between first and second or later winter plumages are relative, and, although the colors appear to average deeper with age, the age of a specimen may only be told with certainty by osteological characters. The lesser wing-coverts are more frequently greenish in adult females.

The postnuptial moult of *salicamans* begins fully a month or two earlier than that of *tristis*. Two ragged males of August 12, evidently passing from first nuptial plumage, have acquired three new primaries, a few tertiaries and wing-coverts and some of the body plumage, while a specimen of August 27 (probably a year or more older than the much worn birds just mentioned) is further advanced, having six new primaries, and four pairs of rectrices and much of the new body plumage and coverts. Comparing these birds with September or October specimens of *tristis* just completing the moult, I find that the browns are equally dark and apparently the two forms indistinguishable at this stage. As in *tristis*,

the California bird wears this plumage for three or four months before the second prenuptial moult begins. September, October and November are unfortunately not represented in the series of *salicamans* except by one bird of November 27, already showing evidences of the nuptial dress by a few black feathers on the crown and yellow ones elsewhere. Just as in *tristis*, the California bird of the second winter has the wings and tail slightly longer and the plumage somewhat richer than that of the first, and with the yellow of the lesser wing-coverts in males the distinguishing character. The bird of November 27 and two of December 5 have lost the buff of the wing edgings, and have faded somewhat on the back and sides, but the incoming of the yellow nuptial feathers already obscures the winter colors and many black feathers of the crown have appeared. I think that some of them have come in at the postnuptial moult, as this sometimes occurs in eastern birds. Specimens of February and March are, as a rule, so little paler than those of December, that the winter fading must be less than in *tristis*, presumably comparable *tristis* of March and April being nearly all of them grayer. A number of April *tristis* with new yellow and black feathers mixed with the winter dress are, however, absolutely indistinguishable from *salicamans* at like stage of the moult, and the variation between winter specimens of *tristis* is so great that it is easier to sort out on like dates a light and a dark race than to distinguish even a majority of *salicamans* as markedly different. Similar conditions prevail among the females. Both sexes do appear to be darker at the beginning of the prenuptial moult than *tristis*, but apparently only because they have faded less and show a yellower tinge in their plumage.

The male winter type of *pallidus* (Amer. Museum No. 52667, January 20) is of course a faded bird, but it seems to be large and pale with very broad edgings. A few December birds resemble it and a bird of March 6 has begun the prenuptial moult. Several females, apparently adults, are not so much paler than *tristis* as might be expected, but the material available is altogether too scanty to arrive at very satisfactory conclusions.

6. *Second Nuptial Plumage.*—The second prenuptial moult of *tristis*, like the first, is partial, affecting only the body plumage. There seems to be little or no appreciable difference in the inten-

sity of the yellow of successive nuptial plumages of males, although the depth of color varies somewhat according to the individual. There are lighter and darker first nuptial plumages and similar second or later nuptial plumages, but the variation in shade of color between deep canary and pale lemon-yellow is surprisingly small. The lesser wing-coverts serve to distinguish young breeding birds from adults.

The second prenuptial moult of *salicamans* probably averages more extensive than the first. A grayish collar on the nape is usually the last relic of the winter dress, but the yellow may be considerably obscured by old feathers elsewhere. The end of March usually finds *salicamans* in nuptial dress, although there is evidently great individual variation in its time of completion. If the growth of plumage continues into the breeding season as observed by Mr. Grinnell, it is a condition that is not found in *tristis* although not without a parallel in other species of birds. April is not represented in the series examined, but the birds of late May seem to have completed their moult a good while before.

The type of *pallidus* (Amer. Museum No. 52666, ♂, May 3) is a bird of the second summer or older. It is large, with a long tail, and shows much white edging, but I do not consider it of a paler yellow than *tristis*, and it would be hard to pick it out of a series of *tristis*.

The measurements in Table I show variations in dimensions due to sex, to age, and to season, *tristis* being contrasted with *salicamans*. As all the measurements are mine they are strictly comparable. The wing is measured with dividers from the proximal end of the carpo-metacarpus to the tip of the longest primary, *i. e.*, the eighth enumerating from the wrist outward; the tail from the point of insertion of the middle pair of rectrices into the skin to the tip of the longest, *i. e.*, the outer pair; the tarsus and middle toe along their greatest anterior length; and the bill along the chord of the culmen and also its greatest depth.

TABLE I.
MALES.

SPECIMENS	PLUMAGE	WING			TAIL			TARSUS			MIDDLE TOE			CLAW OR MIDDLE TOE			BILL (exposed culmen)			BILL (depth at base)		
		Aver. mm.	Max. mm.	Min. mm.	Aver. mm.	Max. mm.	Min. mm.	Aver. mm.	Max. mm.	Min. mm.	Aver. mm.	Max. mm.	Min. mm.	Aver. mm.	Max. mm.	Min. mm.	Aver. mm.	Max. mm.	Min. mm.	Aver. mm.	Max. mm.	Min. mm.
5 thrists	Juvenal	69.8	70.9	68.6	47.5	48.3	46.2	12.9	13.5	12.2	10.2	10.7	9.4	4.6	5.3	3.8	8.1	8.9	7.4	5.8	6.1	5.3
5 salicannans	"	67.6	69.3	65.0	45.7	48.8	44.1	13.2	13.7	12.7	10.7	11.2	10.2	4.3	4.8	4.3	8.9	9.6	8.1	6.1	6.3	5.8
24 thrists	1st Winter	70.1	73.7	66.5	48.3	49.8	44.4	13.2	13.7	12.7	10.5	11.2	9.9	4.6	5.3	3.8	9.1	9.9	8.4	6.1	6.6	5.8
9 salicannans	"	67.8	69.1	66.8	46.5	49.8	44.7	13.2	13.7	12.7	10.7	11.2	10.2	4.6	4.8	4.3	9.1	9.9	8.4	6.3	6.9	5.8
13 thrists	1st Nuphtal	69.1	71.1	66.3	46.7	50.3	44.4	13.2	13.7	12.7	10.7	10.9	10.2	4.6	5.1	3.8	9.4	9.6	8.6	6.1	6.3	5.8
20 salicannans	"	67.3	69.1	65.5	46.0	47.2	43.2	13.2	14.2	12.7	10.4	11.2	10.2	4.8	5.6	4.1	9.4	10.7	8.6	6.6	6.3	6.2
16 thrists	2d Winter	71.6	73.7	69.6	50.0	52.1	48.3	13.4	14.2	12.7	10.7	11.2	10.2	4.8	5.6	4.1	9.4	9.6	8.6	6.1	6.6	5.8
14 salicannans	"	69.8	73.7	67.6	48.8	50.3	46.2	13.2	13.7	12.7	10.4	10.9	9.6	4.8	5.3	4.1	9.6	10.2	8.9	6.3	6.6	5.6
8 thrists	2d Nuphtal	70.6	72.6	68.6	47.7	50.8	44.7	13.5	14.0	12.7	10.4	10.7	10.2	4.8	5.3	4.3	9.4	10.2	8.9	6.2	6.6	5.6
6 salicannans	"	67.8	69.1	66.5	47.0	49.0	43.9	13.2	13.7	13.0	10.5	10.9	10.2	4.8	5.1	4.1	9.1	9.6	8.6	6.3	6.6	6.1
66 thrists		70.2	73.7	66.3	48.0	52.1	44.4	13.2	14.2	12.2	10.5	11.2	9.4	4.7	5.6	3.8	9.1	10.2	7.4	6.3	6.6	5.3
54 salicannans		68.1	72.6	65.0	46.8	50.3	41.1	13.2	14.2	12.7	10.5	11.2	9.6	4.6	5.3	4.1	9.2	10.7	8.1	6.1	6.9	5.6

FEMALES.

SPECIMENS	PLUMAGE	WING			TAIL			TARSUS			MIDDLE TOE			CLAW OR MIDDLE TOE			BILL (exposed culmen)			BILL (depth at base)		
		Aver. mm.	Max. mm.	Min. mm.	Aver. mm.	Max. mm.	Min. mm.	Aver. mm.	Max. mm.	Min. mm.	Aver. mm.	Max. mm.	Min. mm.	Aver. mm.	Max. mm.	Min. mm.	Aver. mm.	Max. mm.	Min. mm.	Aver. mm.	Max. mm.	Min. mm.
5 thrists	Juvenal	68.8	70.6	67.6	47.5	49.3	44.2	12.9	13.7	12.7	10.2	10.7	10.2	4.8	5.1	4.6	8.6	9.1	7.6	5.6	5.8	5.6
5 salicannans	"	65.8	67.1	65.3	45.2	46.2	44.4	12.7	13.2	11.7	10.4	10.9	10.2	4.6	4.8	4.6	8.6	9.1	7.9	6.1	6.6	5.8
22 thrists	1st Winter	68.1	70.1	66.0	47.7	50.3	44.7	12.9	13.5	12.2	10.4	10.9	10.2	4.6	5.3	4.1	8.6	9.1	8.1	5.8	6.1	5.3
5 salicannans	"	65.5	66.8	63.5	45.2	47.7	43.4	12.7	12.9	12.4	10.2	10.7	9.6	4.6	5.1	4.3	8.6	9.1	8.4	6.3	6.6	5.8
9 thrists	1st Nuphtal	67.8	68.6	66.5	46.7	48.3	45.2	13.2	13.7	12.7	10.2	10.9	10.2	4.8	5.1	4.3	8.9	9.4	8.4	6.1	6.1	5.8
11 salicannans	"	64.8	67.8	62.2	43.9	46.7	46.6	12.7	13.2	12.2	10.2	10.4	10.2	4.6	4.8	3.6	9.1	9.6	8.6	6.3	6.6	5.8
4 thrists	2d Winter	68.6	69.6	67.8	48.3	49.5	46.5	13.2	13.5	13.2	10.3	10.7	10.2	4.6	5.1	4.1	9.0	9.1	8.9	6.1	6.3	5.8
3 salicannans	"	65.3	66.3	64.5	46.0	47.7	45.2	12.7	12.7	12.4	10.2	10.2	10.2	4.3	5.1	4.3	9.6	9.6	9.4	6.3	6.6	6.1
7 thrists	2d Nuphtal	68.3	71.1	66.0	47.7	49.8	45.7	12.9	13.5	12.2	10.4	10.9	10.2	4.6	5.6	3.8	9.1	9.9	8.6	6.1	6.3	6.1
2 salicannans	"	65.3	65.5	65.0	44.4	45.7	43.2	12.4	12.7	12.2	10.3	10.4	10.2	4.1	4.8	3.3	9.2	9.4	9.1	6.0	6.1	5.8
47 thrists		66.9	71.1	66.5	47.6	50.3	44.2	13.0	13.7	12.2	10.3	10.9	10.2	4.7	5.6	3.8	8.8	9.9	7.6	6.0	6.6	5.3
26 salicannans		65.3	67.8	62.2	44.9	47.7	40.6	12.6	13.2	11.7	10.3	10.9	9.6	4.4	5.1	3.3	9.2	9.6	8.1	6.2	6.6	5.8

The remiges and retrices being worn for a twelvemonth, it is obviously unfair to contrast a series that might be chiefly worn birds with one consisting of fresh-plumaged specimens, so I have prepared the following table which contrasts fresh with worn birds.

TABLE II.

MALES.					Wing.	Tail.
14 tristis,	before 1st midwinter	.	.	} Fresh	70.4	48.3
5 salicamans	" " "	.	.		68.1	47.2
8 tristis	" 2nd "	.	.		71.9	50.0
8 salicamans	" " "	.	.		70.4	49.0
8 tristis,	after 1st midsummer	.	.	} Worn	68.1	46.0
20 salicamans	" " "	.	.		67.3	46.0
7 tristis	" 2nd "	.	.		70.9	47.2
5 salicamans	" " "	.	.		68.1	46.7
FEMALES.						
9 tristis,	before 1st midwinter	.	.	} Fresh	68.3	47.0
6 salicamans	" " "	.	.		66.0	45.5
3 tristis	" 2nd "	.	.		68.3	48.3
3 salicamans	" " "	.	.		65.3	46.0
3 tristis,	after 1st midsummer	.	.	} Worn	67.6	46.7
11 salicamans	" " "	.	.		64.8	43.9
2 tristis	" 2nd "	.	.		69.8	46.2
2 salicamans	" " "	.	.		65.3	44.4

The two tables indicate that adults average a little larger than young birds and suffer more from wear, both losing between periods of moult an appreciable amount of the ends of the wings and tail. It further appears that *salicamans* averages slightly smaller in wings and tail and slightly larger in bill, but the smallness of all of these average differences is apparent if we analyze the figures. I have carried them to tenths of a millimeter in order to be able to show the differences and there is such an overlapping of dimensions in individuals that the ruler gives slight information as to the age, season or race to which a specimen may belong. The average difference in length of wings and tail between *tristis* and *salicamans* is about *two* millimeters, a like difference existing between first and second year birds of either race, and a similar amount of wing and tail length being lost through wear in each race. It is obvious that we are dealing with extremely small vari-

ations whatever way we look at them, and there is still another factor in the matter with which we must reckon. This is the personal factor, and by it I mean that no two students are likely to measure the same series of birds alike. The subjoined table, compiled from published records, shows variations quite as great as any of which I have already spoken, and illustrates individual variation in the measurer rather than in the measured.

TABLE III.

	Wing	Tail	Tarsus	Toe	Culmen	Depth
<i>tristis</i> , males.						
Grinnell, 15 specimens	72.9	52.1	—	—	9.1	6.3
Mearns, 26 "	72.4	50.8	13.7	10.9	10.2	—
Ridgway, 18 "	72.6	47.0	13.7	10.7	10.2	7.4
Dwight, 66 "	70.2	48.0	13.2	10.5	9.1	6.3
<i>tristis</i> , females.						
Grinnell,	—	—	—	—	—	—
Mearns, 7 specimens	70.4	49.5	14.0	10.2	10.2	—
Ridgway, 13 "	68.6	43.4	14.0	10.7	9.9	7.4
Dwight, 47 "	66.9	47.6	13.0	10.3	8.8	6.0
<i>pallidus</i> , males.						
Mearns, 10 specimens	78.0	56.0	13.8	12.0	10.9	—
Ridgway, 17 "	74.9	50.3	14.2	10.7	10.4	7.2
Dwight, 7 "	74.9	54.1	13.5	10.4	9.4	6.3
<i>pallidus</i> , females.						
Mearns, 11 specimens	75.0	54.0	14.0	10.0	10.7	—
Ridgway, 13 "	72.4	46.7	13.9	10.7	10.4	7.1 ¹
Dwight, 8 "	72.1	51.0	13.5	10.7	9.5	6.1
<i>salicamans</i> , males.						
Grinnell, 15 specimens	70.1	50.0	—	—	9.9	6.9
Ridgway, 9 "	70.1	44.4	13.7	10.7	10.2	7.6
Dwight, 54 "	68.1	46.8	13.2	10.5	9.2	6.1
<i>salicamans</i> , females.						
Grinnell,	—	—	—	—	—	—
Ridgway, 3 specimens	68.3	44.2	13.2	10.7	10.2	7.6
Dwight, 26 "	65.3	44.9	12.6	10.3	9.2	6.2

The most obvious fact to be deduced from the foregoing table

¹ Five specimens.

is that niceties in dimension mean very little unless the measurements are taken by one person. It is equally true that small variations in color cannot be described so as to be understood by anyone but the describer. So it comes about that the geographical race of to-day, depending on minor variations, cannot be recognized by its published description, but rests upon characters which may only be made out by studious comparison, not of single skins, but of series of them. It may be said that the individual and seasonal variations to which I have called attention are trivial. That may be true, but they are quite as real as recognized geographical differences.

While I am ready to admit that *pallidus* and *salicamans* are perhaps quite as good races as others that pass current, I must confess I fail to see the scientific value of naming variations so equaled and overlapped by individual and seasonal differences that only a small percentage of specimens in hand can be identified without first knowing the locality from which they come. Identification of the specimen is, of course, only a secondary matter in proving variation by averages, but, it seems to me, unless variations wide enough to be recognized by other students are established, the naming of a race becomes a mere matter of personal opinion or personal vanity.