

ARTICLE XVIII.—*Remarks on Individual and Seasonal Variation in a Large Series of Elainea from Chapada, Matto Grosso, Brazil, with a Revision of the Species of the restricted Genus Elainea.* By J. A. ALLEN.

INTRODUCTION.

The first part of this paper (pp. 184-195) relates to a large series of specimens of *Elainea** collected at Chapada, Matto Grosso, Brazil, from an area of about five-miles' radius, by Mr. H. H. Smith and his assistants, during the years 1882-85. This series comprises 129 specimens, representing four species, as follows: *E. affinis*, 8 specimens; *E. gaimardi*, 4 specimens; *E. placens*, 10 specimens; *E. pagana-albiceps*, 116 specimens. Of these last, a part are referable to the true *E. pagana* of authors, and a still larger number to what is commonly recognized as *E. albiceps*, while the great bulk of the series is made up of specimens variously intermediate between these two forms. Despite much variation, it is impossible to separate the series into groups presenting any tangible characters by which they may be defined.

In order to satisfactorily determine the relationships of the puzzling birds represented in the Chapada series, I found it desirable to bring together as much material as possible. I am accordingly indebted to the kindness of Mr. Robert Ridgway for the series of *Elainea* contained in the U. S. National Museum (numbering about 200 specimens); to the Boston Society of Natural History, through Mr. C. B. Cory, Curator of the Department of Birds, for the types of several of the d'Orbigny-Lafresnaye species of the genus; and to Mr. William Brewster, of the Cambridge Museum of Comparative Zoölogy, for much needed material.

Thus about 400 specimens have been examined in the preparation of the present paper. Among them are the types of *Muscipeta albiceps* and *Muscicapa olivacea* d'Orb. & Lafr., *Muscicapa brevirostris* Wied, *Elainea frantzii* and *E. chiriquensis* Lawr., and *E.*

* Since this paper was put in type I have discovered that the original form of this name was "*Elanea*" (cf. Waterhouse, Ind. Gen. Av., 1889, p. 70), which, in accordance with the American Ornithologists' Union "Code," in respect to the emendation of names, should be adopted. We find it has been written more or less commonly *Elenia*, *Elaenea*, *Elainia*, *Elainea*, and *Elania*. Likewise *Cyclorhis* (see antea, pp. 123-135) should be written *Cyclarhis*, to conform to the original orthography.

cinerescens Ridgw. ; also authentic specimens of *E. subpagana* Scl. & Salv., *E. semipagana*, *E. griseogularis*, *E. pudica*, *E. gigas*, and *E. riisii* Scl., *E. barbadensis* Cory, and *E. obscura rustica* Berl. Also *E. pagana*, *E. mesoleuca*, *E. modesta*, and *E. rustica* as recognized by Lafresnaye ; "*E. modesta* Tsch," as recognized by Professor Philippi, and *E. mesoleuca* as recognized by Berlepsch. Several species, very desirable for examination in the present connection were, however, unfortunately lacking.

I.

INDIVIDUAL AND SEASONAL VARIATION IN THE CHAPADA SERIES OF *Elainea*.

The Chapada series of *Elainea* referable to the *E. pagana-albiceps* group presents a wide range of variation, not only in size and coloration, but especially in the size and form of the bill. Were there fewer specimens, representing the same range of variation, but with most of the "intermediates" left out, it would be quite easy to divide the series into several apparently well-marked species, and not hard to find names for them among the alleged species already described. Especially would this be the case were the specimens gathered from a wider geographical area, with the leading forms more or less localized. As the case stands, however, the specimens are all from a single very limited locality, and the gaps between the extreme forms are completely filled by specimens presenting every intermediate phase of variation. Besides, the variations in any one feature,—as in the form of the bill, in general size, the relative length of the outer primaries, or the relative length of wing to tail,—are found not to correlate with variations in other features ; so that while the specimens may be somewhat arbitrarily divided into series on general size, or on the form of the bill, the important variations in other features are not correlated with them but present all sorts of combinations of characters. Indeed, division on either size alone, or color alone, or exclusively on the form of the bill, cannot be made satisfactorily, since there is no point at which a separation can be made. The surprisingly large range of variation shown in this numerous series of *Elainea pagana* obviously has a general

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bearing, and may well be considered as of sufficient importance to warrant special treatment.

Variation in Color.—Arranging the series in the order of collecting, it is at once apparent that the variation in color is mainly seasonal, the two extremes in coloration representing respectively the months of March-April and September-October. Very few of the birds appear to have been collected in January, February, and June, but each of the other months is represented by a large series of specimens. The date of capture for the six brightest specimens is as follows: April 11, April 16, April 13, May 23, March 5, and May 11, in about the order of the intensity of coloration, four of the six specimens being marked as males. The November and December specimens are in much worn, ragged plumage, several of them too much so to be properly used in comparison. The October series is still in comparatively good plumage—not so worn as to obscure the normal coloration; from these eight specimens may be selected as typically representing this phase, collected at the following dates: September 20, and October 1, 3, 9, 9, 14, 17, and 18.

The average October bird (adult breeding phase) may be described as follows: Bill varying from brownish to dusky horn color, much lighter (often flesh color) at the base of the lower mandible. Above, dark greenish olivaceous brown, slightly lighter on the rump; concealed crest clear white; wing-bands and broad edgings of the quills pale greenish white, fading to nearly pure white on the inner secondaries; tail dusky, like the wings, edged with the color of the back, and slightly tipped with soiled whitish. Below, chin and middle of the throat nearly pure dark ashy; breast clear brownish ashy, fading to nearly pure white on the middle of the belly, the purity and area of the white variable in different specimens; sides, inner wing-coverts, and lower tail-coverts strongly washed with greenish olive, palest on the latter. Lores and narrow eye-ring whitish, tinged more or less (in different specimens) with olivaceous. November and December specimens differ mainly in the more worn character of the plumage, and less freshness of coloring.

The average March and April birds (representing the freshly moulted plumage) may be described as follows: Above scarcely

different from the October specimens above described, but rather darker or browner and less green, with the edging of the quills broader and more decidedly light yellowish green. Below, throat gray; breast a more olivaceous (not brownish) gray, the lower throat and whole breast more or less conspicuously streaked with pale greenish yellow, produced by the feathers being margined by this tint; whole abdomen deep sulphury yellow, varying more or less in intensity in different specimens, but always strongly yellow in contrast with the decidedly, and often almost pure white of the abdominal area in October birds; sides darker olivaceous; inner wing-coverts and edge of the wing conspicuously yellow, like the abdomen.

May and June specimens are just intermediate between March-April ones and those taken in October; the yellow of the lower parts having become reduced at least one-half, while the yellow streaking of the breast, while paler, on the whole becomes rather more prominent. In August and September specimens the gray of the breast becomes less olivaceous, or of a purer gray; the yellow flammulations gradually become obsolete and the yellow of the belly becomes much lighter, thus fading gradually into the whitish of the breeding season. White is also more frequently present in the crest.

The concealed white crest seems to be largely a feature of the breeding season, when the feathers forming the whole crest become greatly lengthened, it being then present as a rule in both sexes, and either much less developed or wholly wanting during the greater part of the remaining months. It seems to be only exceptionally present from January to May, during which time the whole crest is less full, and the white at the base is either entirely absent or very slightly developed, only about one bird in five having it conspicuously present. The concealed white crest is certainly not a sexual feature, although seemingly rather more developed in the male than in the female. Neither are the males certainly distinguishable from the females by any feature of coloration or size (as will be shown later), though the males seem to average slightly brighter and larger.

Two birds, still partly in first plumage (Dec. 9 and Jan. 27), are dull brown above with only a faint tinge of olivaceous, the lower

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back and upper tail-coverts tinged with brownish rusty; lesser wing-coverts edged with brown. Below pale buffy white, the breast strongly grayish brown, throat ashy, under wing-coverts and bend of the wing buffy yellow.

Variation in Size.—The individual variation in size seems at first sight enormous, when the largest and smallest specimens of the series are compared, although as will be shown later, it is not greater than occurs in a similar series of specimens of well-known species, where no question of specific diversity can arise. As shown by the subjoined tables (pp. 188–190), the difference is in no way related to season, large and small birds occurring indiscriminately throughout the year, showing that the variation is not due to an influx, through migration, of larger or smaller birds at particular seasons. Neither is it to any great degree sexual, for though the females average slightly smaller than the males, both the largest and smallest specimens of the series are sexed by the collector as females. (The sexes given are in all cases taken from the sex marks placed on the original labels by the collector.)

As shown by Table I, the length of the wing in the male varies from 70.4 mm. (2.77 in.) to 82.6 mm. (3.25 in.), a difference of about half an inch, or 20 per cent. of the average. The tail ranges in the males from 58 mm. (2.30 in.) to 77.5 mm. (3.05 in.), or about six and a half tenths of an inch, or nearly 30 per cent. of the average. The length of the exposed culmen varies from 9.1 mm. (.36 in.) to 10.9 mm. (.43 in.), this variation being quite independent of general size.

The length of the wing in the female varies from 67.8 mm. (2.67 in.) to 85.9 mm. (3.38 in.), and the tail from 56.9 mm. (2.24 in.) to 80.5 mm. (3.17 in.)—a rather greater range than in the males.

As shown by the tables, the transition in size from the smallest to the largest is by almost imperceptible stages, if the last male from Table I, and the first two and last three females of Table II be omitted. Three of the four largest specimens rather strangely prove to be females, and, as they differ from the others only in size, can be regarded as merely exceptionally large individuals.

For obvious reasons, the specimens are arranged in the tables in the order of size, beginning with the smallest, taking the length 1889.]

of the wing as the basis of the arrangement. The measurements were all made by the same person (my friend and colleague, Mr. F. M. Chapman), and written first on the backs of the labels, the specimens being taken at random. After all were measured they were assorted according to size, and the measurements tabulated by transcribing them from the labels. In this way the element of personal equation becomes reduced to a minimum, with no unconscious or other bias in the direction of nicely graduated results. A careful inspection of the tables will render further comment on the subject of variation in size unnecessary.*

Variation in Size and Form of the Bill.—The measurements given in the accompanying tables fail to show adequately the extent and nature of what may be assumed as purely individual variation in the bill. To say that the variation in the length of the bill is 18 per cent. of its average length, and that the variation in breadth at the nostril is nearly a third of the average breadth, gives a less vivid impression of the extent and character of this variation than can be obtained by graphic representation.

* The length of the wing is the length of the folded wing taken in a straight line with dividers; the length of the tail is taken from the end of the "pope's nose" to the end of the longest feather; the "exposed culmen" means from a point in line with the frontal feathers to the tip, in a straight line measured with dividers; the width of the bill is taken at the nostrils.

I.—MEASUREMENTS OF 60 MALES OF *Elainea pagana*, TAKEN AT CHAPADA, MATTO GROSSO, BRAZIL.

Am. Mus. Nat. Hist. No.	DATE.	SEX.	WING.		TAIL.		BILL.			
			Mill.	Inch.	Mill.	Inch.	Exposed Culmen.		Width at Nostrils.	
							Mill.	Inch.	Mill.	Inch.
.....	July 28, 1885,	♂	70.4	2.77	58.4	2.30	10.2	.40	4.6	.18
33,208	Apr. 10, 1883,	♂	71.0	2.80	61.0	2.40	9.9	.39	5.3	.21
33,189	" 17, "	♂	71.0	2.80	63.0	2.48	9.4	.37	5.3	.21
33,440	" 5, "	♂	71.0	2.80	63.0	2.43	9.7	.38	4.6	.18
33,220	Oct. 9, "	♂	71.0	2.80	62.5	2.46	9.4	.37	4.6	.18
33,448	" 3, 1882,	♂	73.0	2.88	66.0	2.60	9.7	.38	4.6	.18
33,226	May 11, 1883,	♂	73.6	2.90	64.8	2.55	9.7	.38	4.6	.18
33,438	Feb. 24, "	♂	73.6	2.90	63.5	2.50	9.1	.36	4.6	.18
33,437	Jan. 3, "	♂	73.6	2.90	65.8	2.59	9.9	.39	6.4	.25
33,168	Apr. 16, 1885,	♂	74.2	2.92	70.0	2.75	9.1	.36	5.6	.22
33,170	July 17, "	♂	74.9	2.95	68.5	2.70	10.4	.41	6.1	.24
33,174	" 16, "	♂	74.9	2.95	62.0	2.44	9.7	.38	4.8	.19
33,425	Aug. 19, "	♂	75.2	2.96	62.0	2.40	9.7	.38	5.1	.20
33,422	" 31, 1883,	♂	75.2	2.96	62.5	2.46	9.9	.39	4.6	.18

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I.—MEASUREMENTS OF 60 MALES OF *Elainea pagana*, TAKEN AT CHAPADA, MATTO GROSSO, BRAZIL.—Continued.

Am. Mus. Nat. Hist. No.	DATE.	SEX.	WING.		TAIL.		BILL.			
			Mill.	Inch.	Mill.	Inch.	Exposed Culmen.		Width at Nostrils.	
							Mill.	Inch.	Mill.	Inch.
33,419	Feb. 10, 1883,	♂	75.7	2.98	....	....	9.9	.39	5.3	.21
33,444	Sept. 11, 1885,	♂	75.7	2.98	66.0	2.60	10.4	.41	5.1	.20
33,218	Oct. 13, 1882,	♂	75.7	2.98	66.0	2.60	9.1	.36	5.1	.20
33,204	Feb. 24, 1883,	♂	75.7	2.98	61.0	2.40	9.4	.37	4.8	.19
33,209	May 4, "	♂	75.7	2.98	65.0	2.56	10.2	.40	5.6	.22
33,212	Sept. 26, 1885,	♂	75.9	2.99	64.0	2.52	9.7	.38	5.8	.23
33,221	Oct. 14, "	♂	76.2	3.00	63.5	2.50	9.9	.39	4.8	.19
33,219	" 17, 1882,	♂	76.2	3.00	65.5	2.58	10.2	.40	4.8	.19
33,210	Aug. 26, "	♂	76.2	3.00	66.0	2.60	10.2	.40	6.7	.27
33,217	Sept. 23, 1885,	♂	76.7	3.02	66.0	2.60	10.2	.40	5.1	.20
33,427	Oct. 9, 1883,	♂	76.7	3.02	66.2	2.62	9.7	.38	4.6	.18
33,223	Nov. 11, 1882,	♂	76.7	3.02	67.6	2.66	9.7	.38	5.0	.20
33,446	Sept. 8, 1885,	♂	77.2	3.04	64.5	2.54	10.2	.40	4.8	.19
33,421	Aug.—, 1883,	♂	77.2	3.04	68.5	2.70	9.9	.39	4.8	.19
33,424	" 28, 1885,	♂	77.2	3.04	69.9	2.75	10.2	.40	4.8	.19
33,442	" 15, 1883,	♂	77.2	3.04	67.0	2.64	10.2	.40	6.4	.24
33,178	" 26, 1885,	♂	77.5	3.05	71.1	2.80	10.2	.40	5.6	.22
33,215	Sept. 7, 1883,	♂	77.7	3.06	66.0	2.60	10.2	.40	5.1	.20
33,190	" 20, 1882,	♂	77.7	3.06	66.5	2.62	9.9	.39	4.6	.18
33,192	Mch. 6, 1883,	♂	77.7	3.06	72.4	2.85	9.7	.38	5.6	.22
33,426	Sept. 22, 1885,	♂	77.7	3.06	65.5	2.58	9.1	.36	4.6	.18
33,200	Aug. 26, "	♂	78.2	3.08	72.1	2.84	10.9	.43	5.6	.22
33,171	July 27, 1883,	♂	78.5	3.09	72.1	2.73	10.2	.40	5.8	.23
33,195	" 29, "	♂	78.5	3.09	72.1	2.74	10.2	.40	5.8	.23
33,228	Apr. 1, 1885,	♂	78.7	3.10	74.9	2.95	10.7	.42	5.6	.22
33,182	Sept. 7, "	♂	78.7	3.10	70.0	2.75	9.9	.39	4.6	.18
33,423	Aug. 28, 1883,	♂	78.7	3.10	68.9	2.71	10.7	.42	4.8	.19
33,202	Nov. 13, "	♂	78.7	3.10	74.7	2.94	9.9	.39	6.1	.24
33,192	May 1, "	♂	79.3	3.12	69.1	2.72	10.7	.42	5.6	.22
33,195	July 13, "	♂	78.7	3.10	71.1	2.80	10.2	.40	5.6	.22
33,201	Oct. 7, 1882,	♂	79.3	3.12	71.6	2.82	10.2	.40	5.6	.22
32,183	Sept. 22, 1885,	♂	79.3	3.12	71.6	2.82	10.2	.40	5.6	.22
33,192	May 1, 1883,	♂	79.3	3.12	69.1	2.72	10.7	.42	4.8	.19
33,211	Aug. 20, 1885,	♂	79.8	3.14	70.6	2.78	10.4	.41	4.8	.19
33,184	Sept. 8, "	♂	79.8	3.14	68.6	2.70	10.4	.41	5.6	.22
33,198	Aug. 17, 1883,	♂	79.8	3.14	73.6	2.90	10.2	.40	6.1	.24
33,185	Sept. 8, 1885,	♂	80.3	3.16	73.9	2.91	9.7	.38	5.6	.22
33,199	Aug.—, 1882,	♂	80.5	3.17	74.7	2.94	9.1	.36	4.6	.18
33,224	Dec.—, "	♂	8.8	3.18	71.1	2.80	9.9	.39	4.6	.18
33,181	Sept. 21, "	♂	81.3	3.20	73.7	2.90	10.7	.42	5.8	.23
33,175	Aug. 15, 1883,	♂	81.3	3.20	74.2	2.92	11.2	.44	6.4	.25
33,449	Oct. 1, 1882,	♂	81.5	3.21	70.6	2.78	9.1	.36	5.1	.20
33,196	July 22, 1885,	♂	81.8	3.22	71.1	2.80	9.9	.39	5.1	.20
33,203	.....	♂	81.8	3.22	73.2	2.88	10.9	.43	5.6	.22
.....	Oct. 4, 1882,	♂	82.6	3.25	77.2	3.04	10.9	.43	5.8	.23
33,177	Aug. 19, 1885,	♂	82.6	3.25	77.5	3.05	10.4	.41	6.1	.24
33,097	Sept. 10, "	♂?	89.7	3.53	81.8	3.22	10.7	.42	6.6	.26

II.—MEASUREMENTS OF 30 FEMALES OF *Elainea pagana*, TAKEN AT CHAPADA, MATTO GROSSO, BRAZIL.

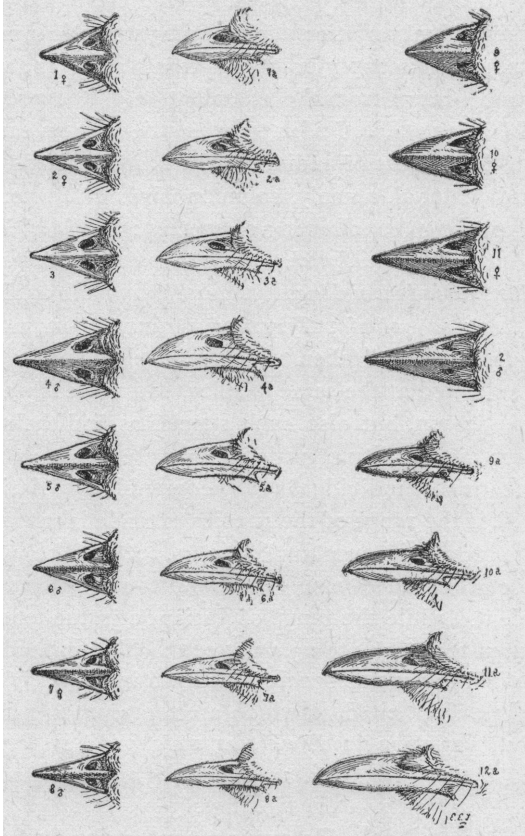
Am. Mus. Nat. Hist. No.	DATE.	SEX.	WING.		TAIL.		BILL.			
			Mill.	Inch.	Mill.	Inch.	Exposed Culmen.		Width at Nostrils.	
							Mill.	Inch.	Mill.	Inch.
33,441	Apr. 18, 1883,	♀	67.8	2.67	56.9	2.24	9.1	.36	5.8	.23
33,227	Mch. 5, "	♀	67.8	2.67	63.5	2.50	9.7	.38	5.6	.22
33,206	Apr. 6, "	♀	69.6	2.74	60.0	2.35	9.7	.38	5.6	.22
33,207	" —, "	♀	69.6	2.74	57.2	2.25	9.4	.37	4.6	.18
33,431	Sept. 21, 1885,	♀	69.9	2.75	59.9	2.36	9.1	.36	4.6	.18
33,445	" 25, "	♀	69.9	2.75	62.3	2.46	9.7	.38	5.6	.22
33,430	Apr. 2, 1883,	♀	70.6	2.78	60.5	2.38	10.2	.40	4.6	.18
33,205	Mch. 17, "	♀	71.1	2.80	63.5	2.50	10.2	.40	5.6	.22
33,428	Oct. 17, 1882,	♀	71.1	2.82	61.0	2.40	9.7	.38	4.6	.18
33,187	" 28, "	♀	71.6	2.82	65.3	2.57	9.7	.38	6.4	.25
33,216	Sept. 26, 1885,	♀	71.9	2.83	62.3	2.45	9.9	.39	5.3	.21
33,166	Mch. 14, 1883,	♀	72.1	2.84	64.5	2.54	10.7	.42	6.4	.25
33,222	Oct. 29, 1885,	♀	72.4	2.85	63.0	2.48	10.2	.40	5.1	.20
33,439	Mch. 6, 1883,	♀	73.6	2.90	68.1	2.68	9.7	.38	5.6	.22
33,442	May 30, "	♀	73.6	2.90	66.6	2.62	10.2	.40	5.6	.22
33,172	July 28, 1885,	♀	74.7	2.94	68.6	2.70	9.7	.38	5.6	.22
33,180	Aug. 20, "	♀?	74.7	2.94	66.0	2.60	9.7	.38	4.6	.18
33,194	Mch. 8, "	♀	75.7	2.98	70.0	2.75	10.7	.42	6.6	.26
33,213	Sept. 22, "	♀	76.2	3.00	63.5	2.50	10.2	.40	4.6	.18
33,429	Nov. —, 1882,	♀	76.5	3.01	68.3	2.69	...	...	5.8	.23
33,186	Oct. 10, 1883,	♀	76.5	3.01	69.6	2.74	9.7	.38	5.6	.22
33,229	Apr. 17, 1885,	♀	76.5	3.02	70.6	2.78	9.1	.36	5.8	.23
33,443	Aug. 15, 1883,	♀	77.2	3.04	67.1	2.64	10.2	.40	5.6	.22
33,214	Sept. 23, 1885,	♀?	77.7	3.06	67.3	2.65	9.7	.38	5.1	.20
33,169	July 17, "	♀	78.0	3.07	71.1	4.80	9.7	.38	5.8	.23
33,188	Nov. 2, 1883,	♀	78.7	3.10	74.4	2.93	10.7	.42	5.8	.23
33,197	Aug. —, 1882,	♀?	80.3	3.16	71.6	2.82	10.2	.40	5.1	.20
33,225	" —, 1885,	♀	84.3	3.32	77.2	3.04	10.2	.40	6.4	.25
33,146	" 27, "	♀	84.8	3.34	79.8	3.14	11.2	.44	6.4	.24
33,096	May 23, 1883,	♀	85.9	3.38	80.5	3.17	10.2	.40	6.6	.26
Smallest male*.....			70.4	2.77	58.4	2.30	10.2	.40	4.6	.18
Largest ".....			82.6	3.25	77.5	3.05	10.9	.43	5.8	.23
Average of 60 males...			77.0	3.03	68.3	2.69	9.5	.374	5.4	.22
Smallest female*.....			67.8	2.67	56.9	2.24	9.1	.36	5.8	.23
Largest ".....			86.1	3.39	80.5	3.17	10.2	.40	6.6	.26
Average of 30 females..			74.7	2.94	66.6	2.62	9.6	.376	5.5	.22

I have accordingly selected for illustration three specimens showing extreme phases of variation, with five others intermediate in form, as shown in the accompanying figures (Figs. 1-8 and Figs. 1^a-8^a). The average form of the bill for the series is shown

* These extremes are not the extremes of individual parts but of the specimens as a whole, or, more correctly, of the size as indicated by the length of the wing.

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in Figs. 5-7, varying on the one hand to specimens shown in Figs. 6-8, where the bill is slender and attenuated (*E. albiceps* form), to the thick, broad (*E. pagana*) form, shown in Figs. 4, 3, and 2, and especially in Fig. 1, where the bill is again small (compare with Fig. 8), but very broad.* The intergradation in the



size and form of the bill is as complete between the extremes figured as is the intergradation in general size, so well shown by the tables of measurements.

For purpose of comparison I have had drawn a corresponding series of variations in the bill of *Elainea affinis*, selected, however,

*The specimens from which these figures are drawn are distinguished in the tables of measurements by the Museum number being printed in heavy-faced type.

from a much smaller series of Chapada specimens, but showing a parallel, if not a more striking, range of variation in the size and form of the bill.

Such variations within specific limits are, however, not rare, though doubtless the facts above presented will be viewed with surprise, if not incredulity, by those who have not made the subject of individual variation a matter of systematic investigation. Before attempting to apply practically the results and inferences naturally to be drawn from the examination of the present large series of *Elainea pagana*, I wish to refer briefly to an early paper* of mine on the subject of individual variation in birds, based on unequivocal material, namely, common birds of Eastern Massachusetts, including the following 10 species: *Sialia sialis*, *Galeoscoptes carolinensis*, *Harporhynchus rufus*, *Geothlypis trichas*, *Piranga erythromelas*, *Habia ludoviciana*, *Pipilo erythrophthalmus*, *Dolychonyx oryzivorus*, *Icterus galbula*, *Tyrannus tyrannus*. In making this investigation care was "taken to not only select specimens of the same sex, collected at the same locality, and as nearly as possible at the same season, but also such species as find their northern limit so near the locality at which they were taken as to obviate the complication of individual with geographical variation, which would result if the range of the species extended far to the northward of the locality in question" (l. c., p. 208). The variation in the length of the folded wing was found to range from about 15 to 21 per cent.; while the range of variation in the length of the tail amounted to from 14 to 23.4 per cent. The individual variation in the bill in several species is shown in plates iv, v, vi, vii, and viii of the work cited, in which are represented very striking cases of bill variation in *Dendroica striata* (pl. iv, figs. 15 and 16), *Mniotilta varia* (ib., figs. 12-14), *Seiurus noveboracensis* (ib., figs. 8-11), *Troglodytes aëdon* (ib., figs. 3-7), *Piranga erythromelas* (ib., figs. 19 and 20), *Tyrannus tyrannus* (ib., figs. 1 and 2), *Spinus tristis* (ib., pl. v, figs. 7-10), etc. In several of these species the variation is quite as great as in the two species of *Elainea* figured in the present paper.

Extreme phases of variation, either in general size or in the form of the bill, are not likely to be met with, or, if met with, to

* On the Mammals and Winter Birds of East Florida, with an examination of certain assumed Specific Characters in Birds, etc. Bull. Mus. Comp. Zool., Cambridge, Mass., Vol. II, No. 3, April, 1871, pp. 161-450, pll. iv-viii.

be duly recognized as such, unless the material in hand consists of very large series of specimens of the same species from a single locality—a case rarely happening in collections of foreign birds.

In the birds of one's own immediate region, the characters of the species are so well known, and the species generally so familiar, that any individual instances of departure from the normal standard are not apt to attract the attention they would if occurring among birds from a distant and little known region. The Smith Collection of Chapada birds happily furnishes series of from 30 to 150 specimens of a large number of the commoner species of the region, including many belonging to such difficult families as the Tyrannidæ, Dendrocolaptidæ, and Formicariidæ, an examination of which shows that the case of *Elainea* is not an exceptional one in the matter of wide range of variation in color, size, and other features. Among the more interesting and instructive of these large series, which we hope to treat later, may be mentioned *Empidochanes fuscatus*, *Empidonax bimaculatus*, *Empidonomus varius*, *Heteropelma flavicapillum*, *Thamnophilus radiatus*, *T. ambiguus*, *Dysythamnus mentalis*, *Herpsilochmus pileatus*, etc. The color variations in some of these species, taking only fully adult birds, include a range so wide as to cover several currently recognized species, some of which are well-marked geographical forms, characteristic of large areas within the general habitat of the species. The fact that they can be exactly matched in Chapada specimens does not, therefore, imply the necessity of their reduction as pure synonyms. In fact, in cases of closely related geographical forms (subspecies) it often happens that the range of individual variation in either form overlaps the characters commonly recognized as distinctive of the forms in question. It is indeed sometimes doubtful whether a supposed straggler of a given form taken out of its normal habitat is to be recorded as a straggler or as an aberrant resident bird.

Before proceeding to a practical application of the facts presented by the Chapada series of *Elainea pagana*, a further and more explicit account of the variations met with may be presented, which may be taken as bearing directly upon the conclusions presented in Part II of the present paper.

Crest.—The form, length of the feathers, their color, and the presence or absence of white at the base of the crest-feathers having frequently entered into specific diagnoses, and often forming one of the chief characters relied on for the discrimination of various species, the following points deserve attention: As already said, an increased development of the crest characterizes the breeding season, when the crest becomes much fuller and the feathers forming it longer, with generally the concealed white at the base of the crest conspicuously developed. Some specimens have a very full crest with no white whatever; in others the white extends almost to the tips of the central feathers, the crest being very full and the whole interior snowy white; in others the feathers of the crown not only have no white, but are not appreciably lengthened; in others the feathers are not much lengthened though showing some white. In many instances the crest-feathers were still growing when the specimen was killed, the sheaths still remaining at the base of the shafts, the dates of capture in these cases conclusively showing that the white at the base of the crest-feathers is a seasonal feature. The crown may be strictly concolor with the back, or much darker, the latter being the usual condition.

Back.—In a few specimens the dorsal surface is clear greenish olive; generally it is dusky olive, or olivaceous brown, varying to olivaceous gray, or grayish brown with no olive shade, or even, in worn plumage, to clear fuscous gray.

Rump.—The lower back and upper tail-coverts are occasionally concolor with the back, but generally lighter and browner, in some specimens distinctly rufescent.

Wings.—The wing-bands and the edges of the outer secondaries vary from pure white to grayish white, or even strongly greenish white in freshly moulted birds. A third quite distinct wing-band is sometimes present, formed by the light tips of the outer row of lesser coverts.

Eye-ring and Lores.—The lores and eye-ring are generally whitish, varying to greenish white or pale yellowish; sometimes not appreciably different from the color of the surrounding parts. Especially is this true of the loreal region.

Throat and Fore-neck.—The throat is commonly gray, either pure gray or mottled with white, varying occasionally to nearly

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pure white, or to dark gray tinged, particularly on the sides, with olive, or even greenish olive. Fore-neck similar to the throat, but usually darker, less whitish, and more frequently faintly washed with olive.

Lower Parts.—Breast and lower parts generally gray, a little lighter on the middle of the belly, and faintly streaked with pale yellow, varying to breast pale gray, abdomen nearly pure white, and the sides olivaceous grayish brown, more or less streaked with pale yellow, or with no obvious streaking; or the whole lower parts sulphur yellow, slightly more olivaceous gray on the sides, coarsely streaked on the breast with pale yellow and olivaceous gray.

Primaries.—The wing formula is variable, but the third primary is usually the longest, sometimes the fourth, sometimes the second; often the second, third and fourth are equal.

Relative Length of Wing and Tail.—The length of the tail to the length of the wing averages as 88 to 100, but varies from 83 to 100 to 91 to 100.

From the foregoing it is obvious that exact information in respect to the date of capture of any specimen of *Elainea* is an important factor in discussing its status and affinities, and that without such exact data the investigator is bereft of important aid in his work; and it hence follows that specimens without date of capture are of comparatively little value, and may be very misleading. As will be shown later, series of specimens from other localities, when accompanied by dates of collection, abundantly bear out the inferences based on the Chapada series.

II.

ON THE SPECIES AND SUBSPECIES OF THE RESTRICTED GENUS *Elainea.*

In the group here under consideration I include all of the species left in the genus *Elainea* as recently restricted by Messrs. Salvin and Godman in their "Biologia Centrali-Americana" (Aves, Vol. II, Dec., 1888, p. 26), having no occasion at present to deal with the species placed by these authors in their genus *Miopagis*.*

*I fail, however, to appreciate the necessity of thus dividing the species heretofore commonly placed under *Elainea*, especially as I find the principal character, that of the form and position of the nostril, is by no means distinctive of the new genus *Miopagis*.

Elainea pagana.Subsp. *pagana*.

"*Muscicapa pagana* LICHT., Verzeich. der Doubl. des Zool. Mus. der Königl. Univ. zu Berlin, 1824, p. 54." (*Hab.* Bahia.)

Elainea pagana "CAB., in SCHOMB. Guiana, III, 1848, p. 701"; BURM., *Thiere Bras.*, II, 1856, p. 476; CAB. & HEINE, *Mus. Hein.*, ii, 1859, p. 59; SCL., *P. Z. S.*, 1861, p. 406; *ib.*, 1870, p. 834; *Cat. Bds. Brit. Mus.*, XIV, 1888, p. 137; EULER, *J. f. O.*, 1867, p. 228 (nesting habits); PELZELN, *Orn. Bras.*, ii, 1869, p. 106; BERLEPSCH, *J. f. O.*, 1884, p. 301; SALV. & GODM., *Biol. Cent. Am., Aves*, II, 1888, p. 34, and of authors generally.

Platyrrhynchus paganus SPIX, *Av. Bras.*, II, 1825, p. 13, fig. 1.

Muscicapa brevirostris WIED, *Beitr. zur Naturg. Bras.*, III, ii, 1831, p. 799 (type examined).

Muscipeta modesta WIED, *Beitr. zur Naturg. Bras.*, III, ii, 1831, p. 923 (Bahia).

Elainea modesta BURM., *Thiere Bras.*, II, 1856, p. 478 (= *Muscipeta modesta* WIED).

Elainea spectabilis PELZ., *Orn. Bras.*, ii, 1869, p. 176 (Goiaz, one specimen).

?*Elainea ridleyana* SHARPE, *P. Z. S.*, 1888, p. 107; SCL., *Cat. Bds. Brit. Mus.*, XIV, 1888, p. 139.

Subsp. *subpagana*.

?*Elainea incompta* CAB. & HEINE, *Mus. Hein.*, ii, 1859, p. 59 (*juv.*? one specimen, Carthagera).

Elainea subpagana SCL. & SALV., *Ibis*, 1860, p. 36; SCL., *P. Z. S.*, 1861, p. 406; and of various authors prior to 1869.—*Cf.* SCL., *P. Z. S.*, 1870, p. 834, and *Cat. Bds. Brit. Mus.*, XIV, 1888, p. 138.

Elainea semipagana SCL., *P. Z. S.*, 1861, p. 406.—*Cf.* SCL., *P. Z. S.*, 1870, p. 834, and *Cat. Bds. Brit. Mus.*, XIV, 1888, p. 138.

Elainea chiriquensis LAW., *Ann. Lyc. Nat. Hist. New York*, VIII, 1865, p. 176 (types examined); SALV., *P. Z. S.*, 1867, p. 147.

Subsp. *martinica*.

Muscicapa martinica LINN., *Syst. Nat.*, ed. XII, 1766, p. 325 (based on *Muscicapa martinicana cristata*, BRISSON, *Orn.*, II, p. 362, pl. 36, fig. 2). "*Hab.* in Martinica."

Tyrannula martinica CASSIN, *Proc. Acad. Nat. Sci. Phila.*, 1860, p. 375.

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Elainea martinica TAYLOR, Ibis, 1864, p. 169; SCL., P. Z. S., 1871, p. 271; SALV. & GODM., Biol. Cent. Am., Aves, II, 1888, p. 36 (Cozumel Isl.); CORY, Auk, III, 1886, 230; Bds. West Ind., 1889, p. 117.

Muscicapa albicapilla VIEILL., Ois. d'Am. Sept., p. 66, pl. 37.

Elainea riisii SCL., P. Z. S., 1860, p. 314; *ib.*, 1870, p. 834. (St. Thomas.)—*Cf.* SCL., P. Z. S., 1871, p. 271.

Elainea cinerescens RIDGW., Proc. U. S. Nat. Mus., VII, 1884, p. 180 (types examined). (Old Providence.)

?*Elainea barbadensis* CORY, Auk, V, 1888, p. 47; Bds. West Ind., 1889, p. 292. (Barbadoes.)

Subsp. *albiceps*.

Muscipeta albiceps D'ORB. & LAFR., Syn. Av., p. 47 (Mag. de Zool., 1837) (in part; types examined); D'ORB., Voy., Ois., 1844, p. 319.

Elainea albiceps SCL., P. Z. S., 1858, p. 71; *ib.*, 1861, p. 406; *ib.*, 1870, p. 834; Cat. Bds. Brit. Mus., XIV, 1888, p. 141; TACZ., Orn. Pér., II, 1884, p. 263; BERL. & JHER., Zeits. f. ges. Orn., 1885, p. 133; SCL. & HUDS., Arg. Orn., I, 1888, p. 145; and of authors generally except references to Northern South America.

Elainea modesta TSCH., Wieg. Arch. f. Nat., 1844, i, p. 274; *ib.*, Faun. Per., Aves, 1845-46, p. 159 (Peru; nec *Muscipeta modesta* WIED, 1831, based on Bahia specimens); SCL., P. Z. S., 1861, p. 407; CAB. & HEINE, Mus. Hein., ii, 1859, p. 59; BURM., J. f. O., 1860, p. 246; CAB., J. f. O., 1878, p. 197.—*Cf.* SCL., P. Z. S., 1867, p. 327.

Elainea griseogularis SCL., P. Z. S., 1858, p. 554, pl. 146, fig. 1 (Riobamba, Ecuador); BERL. & TACZ., P. Z. S., 1884, p. 296; *ib.*, 1885, p. 90.—*Cf.* SCL., P. Z. S., 1867, p. 327.

Elainea mesoleuca CAB. & HEINE, Mus. Hein., ii, 1859, p. 60 (Rio Grande, Brazil); BERL. & JHER., Zeits. f. ges. Orn., 1885, p. 132 (*juv.*).

Elainea cristata PELZ., Orn. Bras., ii, 1869, p. 177 (Goiaz).

Elainea albiventer PELZ., Orn. Bras., ii, 1869, p. 177 (Ypanema, Goiaz).

Elainea parvirostris PELZ., Orn. Bras., ii, 1859, p. 178 (*juv.*).

Elainea strepera CAB., J. f. O., 1883, p. 215 (Tucuman).

Elainea gracilis TACZ., Orn. Pér., II, 1888, p. 271 (Chirimoto, Peru—two specimens).

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Elainea pagana.—The type of Lichtenstein's *Muscicapa pagana*, the *Elainea pagana* of authors, is said to have come from Bahia, which thus becomes the type locality for the species. I have before me six specimens labeled as from Bahia, but they are entirely without dates. One is evidently a bird of the year, the others are fully adult, some of them in more or less worn plumage. All except the young bird have the crest feathers white at the base. They vary much in size, the length of the wing ranging from 77.2 mm. (3.04 in.) to 85.3 mm. (3.36 in.), excluding the young bird, which has the wing only 68.6 mm. (2.70 in.). In color the series is quite uniform, being clear grayish fuscous above, with very little tinge of olive, and with the throat and breast pure light gray, and the abdomen clear pale yellow.

Several other specimens from Eastern Brazil are similar, but a series of 8 from Trinidad, and others marked "Cayenne" (probably=Trinidad, from the make of the skins), and also most of the Chapada birds referable to *pagana* are more olive above, and the yellow below is paler or more greenish. The Trinidad birds can hardly be distinguished from many of the Chapada examples, and, strange to say, Grenada specimens, in corresponding plumage, are scarcely distinguishable from either Trinidad or Chapada specimens.

Elainea pagana subpagana.—Nine specimens from Mexico and Central America differ from the Bahia series in averaging slighter smaller, and in being more olivaceous and browner above, and considerably deeper yellow below. The largest and deepest colored specimen is labeled "City of Mexico," and is evidently a fall specimen in freshly moulted plumage. A Panama specimen, dated "21 Dec.," is similar in color but considerably smaller. These two far exceed in depth of coloring, particularly in the intensity of the yellow below, any other specimens in the series. An August specimen (Aug. 4), from Orizaba, in worn plumage, is markedly different from any of the Bahia specimens, taken at any season, the colors being deeper and brighter. The other specimens from Panama and Costa Rica differ decidedly as a series from any corresponding number from Southern Brazil, in the manner already indicated. A Bogota specimen and the Chiriqui series

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are paler, and intermediate between Brazilian and Central American specimens. Obviously no hard and fast line can be drawn between the Central American and Brazilian forms, yet they seem different enough to warrant recognition as well-marked geographical races, the birds from Panama northward being true *subpagana*, the Brazilian birds *pagana*, and the birds from Northern South America intermediates, doubtless covering several minor local forms.

Of four specimens from Chiriqui two (without date) are in fresh autumnal plumage, and two (dated March) are in the paler plumage of the breeding season. These latter are the types of *Elainea chiriquensis* Lawrence. Three of the four are rather smaller than the Bahia birds; two of them have been labeled *E. subpagana* by the late Professor Baird.

Elainea incompta Cab. & Heine I have little doubt is a young bird in the plumage following the first moult.

***Elainea pagana martinica*.**—The type of Brisson's *Muscicapapa martinicana cristata*, the basis of the *Muscicapapa martinica* Linn., and of the *Elainea martinica* of modern authors, came from the Island of Martinique. About 50 specimens of what is commonly called *E. martinica* are before me, representing 16 different islands. Fortunately a large proportion of the specimens are labeled with the date of collection, and the dates cover nearly all the months of the year. The most striking fact brought out by an examination of this material is the great amount of seasonal variation in color. Winter birds, from whatever locality, show much more olive green in the dorsal plumage, and a much stronger wash of yellow below, than summer specimens, in which these tints are sometimes wholly absent, and of which generally only a faint trace remains. The white in the crest appears to be at all times strongly developed, being entirely wanting in none of the specimens examined.

Birds from the different islands present much variation. Grenada birds, and some Martinique examples, can be exactly matched, as already said, by numerous specimens in the Chapada series, and it is almost a question (as already noted by Mr. Sclater, P. Z. S., 1871, p. 271), whether the Grenada bird should not be referred 1889:]

to true *pagana*. Cozumel and Grand Cayman specimens come very close to Grenada specimens, when birds taken at the same season are compared. Specimens from Tobago and the Windward Islands, from St. Vincent to St. Eustatius and Saba, and also St. Thomas, are paler, with less olive above and less yellow below, which latter is also more of a greenish shade. April specimens from Old Providence Island (= *E. cinerescens* Ridgw.) are the palest and grayest of the series, though closely matched by some St. Eustatius specimens (without date—probably summer) and Cozumel summer specimens.

Four specimens from Barbadoes (representing *E. barbadensis* Cory) are quite different in color from any others, being browner above and grayer below, with a faint tinge of buff instead of yellow on the abdomen and crissum. The wing-bars are brownish white, very strongly so in two (apparently young birds), in which the white at the base of the crest-feathers is also edged with brownish, just as in young specimens of true *pagana* it is often tinged with pale greenish yellow. In size these specimens are not larger than specimens from Martinique and Dominica.

In *martinica*, as in the other forms, the bill varies much in size, shape, and color, but averages longer, more attenuated, and blacker than in either *pagana* or *subpagana*. *Martinica* also averages larger, the wing seldom falling below 76.2 mm. (3.00 in.), and frequently reaching 86.4 mm. (3.40 in.), with a maximum of about 87.6 mm. (3.45 in.), and an average of 81.3 mm. (3.20 in.). True *pagana* attains nearly the same maximum, but the wing less frequently exceeds 81.3 mm. (3.20 in.), and the average falls to 79.0 mm. (3.11 in.), excluding altogether the Chapada series.

It is probable that large series from different islands, when compared, will be found to present slight average differences, as in the case of other birds of similar distribution, but at present* lack of material renders an attempt to discriminate such forms impracticable.

Elainea pagana albiceps.—*Muscipeta albiceps* d'Orb. & Lafr. (= *Elainea albiceps* of more recent authors) proves to be a com-

* Owing to Mr. Cory's absence from the country at the time this paper was written, I had not the opportunity of comparing his immense West Indian series of *martinica* with the other material in hand. I had, however, previously examined it cursorily; and he agrees with me that its use in this connection would not have materially affected the conclusion I have reached without it.

posite form, judging by alleged types in the Lafresnaye Collection, kindly loaned me for examination by the Boston Society of Natural History. The localities are given in the original description, and by d'Orbigny in the "Oiseaux" of his "Voyage," as Rio de Janeiro, Yungas (Bolivia), and Tacna (Peru). The specimens are Nos. 4679, 4680, and 4681 of the Lafresnaye Collection. No. 4680 is a typical *E. pagana*, and is doubtless the Rio specimen. The other two agree in color, and in the character of the bill, but differ considerably in size; they agree fairly well, however, with what is now currently recognized as *E. albiceps*. It is of course impossible to decide which specimen is from Yungas and which from Tacna. The original description of *albiceps* will apply about as well to *pagana* as to *albiceps*. In fact, these authors seemed to think their *albiceps* was probably the same as *pagana* of Lichtenstein, as they observe, "*Muscicapæ paganæ* Licht., n° 562, descriptioni nimium prope accedit; sed erecta basi albescens non ibi citatur" (l. c.). The two "*albiceps*" specimens seem also to be the same as *E. modesta* Tsch.

Mr. Sclater considers *E. albiceps* as ranging throughout "all South America, except Colombia," and adds: "The characters of this variable species are taken from specimens obtained in Southern Peru by Whitely, which agree nearly with d'Orbigny's types* in the Paris Museum" (Cat. Bds. Brit. Mus., XIV, p. 142). In the present connection I propose to restrict *albiceps* to the Andean region, from Colombia and Ecuador southward, including Peru, Bolivia, Paraguay, the extreme southern part of Brazil, and the region thence southward to the Straits of Magellan. From this region I have, altogether, a large series of specimens, in which I include about one-third of the Chapada series. As thus restricted it is a rather smaller form than *pagana*, with a much smaller, slenderer bill, much narrower at the base, laterally more compressed and more attenuated. The width of the bill at the middle of the nostrils averages 4.3 mm. (.17 in.) against 5.6 mm. (.22 in.) for the same measurement in true *pagana*. In the breeding season it differs from *pagana* in being much greener above, the throat and breast a deeper, darker gray, the sides more greenish

* How many alleged types of *M. albiceps* d'Orb. & Lafr. are still extant? There are three, as already stated, marked as types in the Lafresnaye Collection!

olivaceous, the middle of the belly white or whitish instead of pale yellow, in some specimens, and particularly on the sides and crissum, washed faintly with pale yellowish green, or greenish yellow, very different from the yellow of the same parts in Bahia specimens of *pagana*. Specimens with the length of the wing above 76.2 mm. (3.00 in.) are rather infrequent, the average being about 74.2 mm. (2.92 in.). In the fresh plumage (soon after the moult) the throat and breast are faintly streaked with pale greenish yellow, and the belly is strongly tinged with the same color.

My series includes 9 specimens from Patagonia (taken Oct.-Jan.), 4 from Buenos Ayres and Uruguay (Oct.-Dec.), 3 from Southeastern Brazil (without date), 5 from Chili (without date), and some 30-40 from Chapada. About one-half of the Chapada specimens may be fairly referred to *pagana*, and one-third to *albiceps*, leaving about one-sixth as intermediates, varying in all possible ways toward either form. Several of the Chapada birds are so exactly like Grenada and Dominica birds (*martinica*) that, as said above, without the labels, it would be impossible to say to which locality they should be referred. Again, several specimens in the Chapada series are not distinguishable from some of the Costa Rica specimens of *E. frantzii*! A young specimen in the Lafresnaye collection labeled "*Elainea modesta* Tschudi, Colombia" I am in doubt whether to consider *E. frantzii* or *E. albiceps*. Of two Ecuador specimens one is typical *albiceps*, while the other appears to be better referred here than elsewhere; it has been labeled "*E. modesta*" by Mr. Sclater.

As already shown (Tables I and II), narrow-billed and wide-billed birds occur at Chapada throughout the year, as also do short wide-bills and long wide-bills, and long narrow-bills and short narrow-bills, although the latter are in most cases obviously rather young birds. The differences in color are, of course, mainly seasonal, but a specimen combining a wide bill with much yellow below is my criterion for referring any of the Chapada birds to *pagana*,—a ruling, of course, entirely arbitrary. Only the smallest billed specimens, however, have the bill as small as the average bill in specimens from further south.

Finally, in respect to the Chapada series, I at one time set aside a series of the narrow, slender billed birds as *E. albiceps*, a smaller

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series (about 5 specimens) as *E. spectabilis* Pelz., and a few others as true *pagana*, but further examination showed no lines of demarkation, these several series merging in all possible ways into a great residuum, many of the components of which I still find it impossible to satisfactorily allocate. I think, however, I can select from the series specimens which clearly represent the various species synonymized above under *pagana* and *albiceps*.

The *Elainea mesoleuca* Cab. & Heine, and of authors, I have no doubt, is represented in the Chapada series by a number of young birds in presumably the plumage following the first moult, in which the upper parts are deep greenish olive, with generally no white in the crest, the wing-bars greenish white, the throat and breast deep dark gray, the latter more or less, and the sides strongly washed with greenish, the belly, lower tail-coverts, and under wing-coverts washed with yellowish green, with also the sides of the throat (malar border) dusky greenish. None of the Chapada birds are quite so green, either above or below, as a Taquara specimen in the National Museum Collection (No. 108,237), received from Count v. Berlepsch, labeled *Elainea mesoleuca*; but the resemblance is so close as to leave no doubt of their identity;—especially in view of the fact that ordinary *albiceps* is rather greener in the more southern specimens as compared with Chapada examples. Mr. Sclater suggestively observes: "Some specimens of *E. albiceps*, in which the vertical spot is absent, come very near this species [*E. mesoleuca*], and have caused me some difficulty. . . . I am by no means sure that they are anything more than females and young of *E. albiceps*." Berlepsch also mentions (l. c.) specimens from Taquara intermediate between *E. albiceps* and *E. mesoleuca*, and raises the question as to whether they are to be considered as hybrids between these two species, or whether *E. albiceps* and *E. mesoleuca* should be united as one species.

Elainea gigas.

Elainea albiceps SCL., P. Z. S., 1860, p. 71 (nec D'ORB. & LAFR.).

Elainea gigas SCL., P. Z. S., 1870, p. 831; Cat. Bds. Brit. Mus., XIV, 1888, p. 140; TACZ., Orn. Pér., II, 1844, p. 265.

This species, while resembling *E. pagana* in a general way, seems perfectly distinct from it by its much larger size, its generally
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darker and more olivaceous upper plumage, the deeper olivaceous of the breast and sides, brighter yellow of the belly, and particularly by the olive gray lower tail-coverts, edged with pale yellowish. The single specimen before me referable to this species is from Ecuador, and measures as follows: Wing, 99.1 mm. (3.90 in.); tail, 36.4 mm. (3.40 in.); culmen, 12.7 mm. (.50 in.); width of bill at nostrils, 6.4 mm. (.25 in.). The conspicuously white crest feathers have the white faintly tinged with pale greenish yellow.

Elainea fallax.

Elainea fallax SCL., P. Z. S., 1861, p. 407 (no description); *ib.*, 1870, p. 832; Cat. Bds. Brit. Mus., XIV, 1888, p. 147; CORY, Auk, III, 1886, p. 231; Bds. West Ind., 1889, p. 118.

This small Jamaican form is very distinct from any other species of the genus. In coloration it most resembles *E. frantzii*, from which its small size and the large amount of concealed white in the crest at once distinguish it. The three specimens before me representing the species call for no special remark.

Elainea frantzii.

Elainea frantzii LAWR., Ann. Lyc. Nat. Hist. New York, VIII, 1865, p. 172; *ib.*, IX, 1868, p. 112; SCL. & SALV., P. Z. S., 1879, p. 513; SCL., Cat. Bds. Brit. Mus., XIV, 1888, p. 145; SALV. & GODM., Biol. Cent. Am., Aves, II, 1888, p. 36.

Elainea pudica SCL., P. Z. S., 1870, p. 833; BERL., J. f. O., 1884, p. 302.—*Cf.* SCL., P. Z. S., 1879, p. 513.

This species finds its nearest ally in *E. obscura* (d'Orb. & Lafr.); indeed, some specimens of *E. obscura* "*rustica*" Berlepsch would be hard to distinguish from certain specimens of *E. frantzii*, were the labels removed. *E. obscura* is generally darker above, with a rather larger and blacker bill, and less olive on the throat, which latter specimens of *E. frantzii* in worn plumage often also lack. The individual variation in the two species, as regards general size, the size and form of the bill, and the coloration, distinctly overlap. Were it not that a supposed considerable interval where neither occurs separates their respective habitats, it would not seem rash to consider them as merely subspecies of one species. While *E. obscura* is supposed to never have white in the crown, 14 of my 25 specimens of *E. frantzii* are also without it, and in the

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other ♀ there is generally only a trace of white, which in several is hardly distinguishable. In none is it nearly so much developed as in average adult birds of the *E. pagana* group, although several of the *E. frantzii* specimens were taken late in April, in worn breeding plumage.

E. pudica Scl. being now admittedly the same as *E. frantzii*, the range of the latter extends southward to the western central portion of Colombia, and eastward at least to Merida, Venezuela. *E. obscura* is reported common as far north as Central Peru, but between this point and Central Colombia I have met with no record of its occurrence. This region is, however, occupied by *E. pallatangæ* Scl.,—a species unknown to me and which I cannot place, though apparently it is more nearly allied to the *E. pagana* group than to *E. obscura* and *E. frantzii*. As a comment on the close relationship of the last two, however, I may refer to a specimen in the National Museum collection (No. 88,441) received from Berlepsch. It is one of Stolzmann's Tambillo specimens, bearing still the collector's label as well as that of Count v. Berlepsch; it is marked "♀, 11 Sept., 1877," being thus in pretty fresh, highly colored plumage. It was originally identified (apparently by the collector) as *E. albiceps*, which name is changed to *obscura*. On the Berlepsch label *Elainea obscura* (Lafr. & d'Orb.) was originally written in ink by Berlepsch, and later changed (in pencil) by some one (apparently Mr. Ridgway) to *frantzii*. No one would question the correctness of the latter identification, except on the ground of locality, it agreeing closely with *E. frantzii* in fresh plumage, in both size and coloration, the bill included. It also agrees in size with the smaller Taquara specimens. Doubtless later exploration in Northern Peru and Ecuador will show that *E. frantzii* and *E. obscura* merge together, geographically and otherwise, somewhere in this intermediate region.

Elainea obscura.

Muscipeta obscura D'ORB. & LAFR., Syn. Av., p. 48 (Mag. de Zool., 1837). Yungas, Bolivia.

Elainea obscura CAB., in TSCH. Faun. Per., Aves, 1845-46, p. 158; CAB. & HEINE, Mus. Hein., ii, 1859, p. 60; SCL., P. Z. S., 1870, p. 835; Cat. Bds. Brit. Mus., XIV, 1888, p. 152; ? PELZ., Orn. Bras., ii, 1869, p. 108; TACZ., Orn. Pér., II, 1884, 270.

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Muscicapa olivacea D'ORB. & LAFR., Syn. Av., p. 54 (Mag. de Zool., 1837). Yungas, Bolivia; type examined.

Elainea olivacea SCL., P. Z. S., 1859, p. 46 (in text); *ib.*, 1861, p. 408.—Cf. SCL., P. Z. S., 1870, p. 835.

Muscipeta guillemini D'ORB., Voy., Ois., 1833-44, p. 319 (= *M. obscura* D'ORB. et LAFR., here renamed).

Muscicapara boliviana D'ORB., Voy., Ois., 1833-44, p. 328 (= *M. olivacea* D'ORB. & LAFR., here renamed).

Elainea obscura rustica BERL. & JHER., Zeitsch. f. ges. Orn., 1885, p. 132.

Elainea rustica SCL., P. Z. S., 1861, p. 408 (= *E. obscura* CAB.).

Muscipeta obscura d'Orb. & Lafr. (= *E. obscura* of recent authors) was described from specimens obtained in the Province of Yungas, Bolivia, and is said to be common on the eastern slope of the Bolivian Andes. Their *Muscicapa olivacea* (= *Muscicapara boliviana* d'Orb., of later date) was also from Yungas, and an alleged type of it (now before me) is still in the Lafresnaye Collection (No. 4686). It is certainly the same as the bird commonly recognized as *E. obscura*.

This is, except *E. gigas*, the largest species of the genus, the wing averaging, in Bolivian and certain South Brazilian specimens, (without definite locality) 88.9 mm. (3.50 in.). While similar in coloration to *E. frantzii*, it is easily distinguishable from it by its much larger size. The concealed white spot so commonly present in the allied forms, appears to be always wanting in this, although Pelzeln has referred to *E. obscura* a specimen with white at the base of the crest feathers.

Count von Berlepsch has separated the Brazilian form of this species (l. c.) from *E. obscura* of Bolivia and Peru on the ground of considerable difference in size and color. This does not appear to be borne out by the limited material at hand, which, however, includes three of Berlepsch's Taquara specimens on which his subspecies *rustica* was based. It is further to be noted that his examples were November specimens, which would differ in color from April specimens just as his two races are supposed to differ. Three of my South Brazilian specimens (one from Iha do Marinheira, the others without definite locality) agree in size with the type of *M. olivacea* d'Orb & Lafr. from Yungas, and are considerably larger than the Taquara specimens.

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One of my specimens (No. 23,951, U. S. Nat. Mus., "South America, Cruise of the Delaware, Dr. G. R. Horner") is noteworthy as being nearly uniform dull gray below (slightly buffy white on the belly), with, however, a few olive-green feathers (still mostly inclosed in the sheaths of the growing feather) here and there interspersed. It is probably a young bird taken at the beginning of the second moult.

Elainea affinis.

Elainea affinis BURM., *Thiere Bras.*, II, 1856, p. 477; SCL., *Cat. Bds. Brit. Mus.*, XIV, 1888, p. 154.

This species has no close relationship with any other species of the genus, being well characterized by its peculiar coloration. It is apparently a rare species in collections, and has thus far apparently escaped synonyms, though presenting the usual wide range of variation in size and color of other members of its genus, particularly in respect to the size and form of the bill, as already shown (*antea*, p. —, figs. 9-12, 9*a*-12*a*). Figures 9 and 12 are drawn from birds which differ very little in size or coloration, but the variation in the size and form of the bill is much greater than frequently occurs in species belonging to entirely distinct genera.

I am in doubt as to the status and relationships of the following species, further than that most of them doubtless fall into the "restricted" genus *Elainea*, and thus require mention in the present connection.

Elainea cinerea PELZ., *Orn. Braz.*, ii, 1869, p. 180.—Based on one specimen from Marabitanas, Brazil. "Alae 2" 5"', caudae 2" 3'". Doubtless = *Serpophaga albogrisea* SCL. & SALV.

Elainea leucospodia TACZ., *P. Z. S.*, 1877, p. 325; *Orn. Pér.*, II, 1884, p. 267.—Western Peru. Similar to *E. albiceps*, but smaller and paler. Wing 62 mm., tail 51 mm.

Elainea taczanowskii BERL., *Ibis*, 1883, p. 137.—Bahia; two specimens. Wing 61.5 mm., tail 54.5 mm. Probably a *Myiopagis*.

Elainea hypospodia SCL., *P. Z. S.*, 1887, p. 49.—Venezuela, one specimen. Wing 2.90, tail 2.50 Allied to *E. pagana*, but with "no trace of olive or yellow in the plumage."

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Elainea olivina SALV. & GODM., *Ibis*, 1884, p. 446; SCL., *Cat. Bds. Brit. Mus.*, XIV, 1888, p. 146, pl. xii.—Similar to *E. frantzii*, but rather smaller, and deeper colored, both above and below.

Elainea pallatangæ SCL., *P. Z. S.*, 1861, p. 407, pl. xli.—Ecuador. "Closely allied to *E. olivina*."

Elainea arenarum SALV., *P. Z. S.*, 1883, p. 190; SCL., *Cat. Bds. Brit. Mus.*, XIV, 1888, p. 153, pl. xxxvi, fig. 3.—*Cf. Sublegatus arenarum* SALV. & GODM., *Biol. Centr. Am.*, II, 1888, p. 37. One specimen, Punta Arenas, Costa Rica.

Respecting this, one may well be excused from venturing an opinion unless able to examine the type. While Mr. Sclater retains the species in *Elainea*, Mr. Salvin, the original describer, refers it to *Sublegatus*, and considers it not specifically different from *Sublegatus glaber* Scl. & Salv. *S. glaber* is figured in *P. Z. S.*, 1868, pl. xiii, fig. 2, and *E. arenarum* in the "Biologia," pl. xxxvi, fig. 3. A comparison of the two plates, purporting to represent the same species, is enough to warn away the timid from any interference in such a complicated case. It is to be hoped, however, that some explanation will be given of how the same species can differ so greatly as these figures represent, in respect both to the form of the bill and coloration, particularly in the color of the loreal region and the lower surface generally.