Although 200 females and 208 males were banded in the spring of 1952, only four of the fourteen recoveries in Table 2 are males. According to the Chi-Square Test, with four and ten the observed frequencies and the expected frequencies calculated from 208 and 200, the deviation of sex ratios of those banded from those recovered may be significant, since the resulting Chi-Square value lies intermediately between the figures denoting significance and non-significance; of course, the value of this test rests on the ability to distinguish the sexes by plumage when at a minimum age of six months. Before anything definite can be noted, however, further clarification on sex identification and more birds for mathematical treatment are necessary.

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LEG SIZES AND BAND SIZES; FIRST REPORT

By Charles H. Blake

The determination of the proper sized band to place on an individual bird can be approached from two directions. If one is not interested in actual measurements and the variation in tarsal size the simplest procedure is to use the "go-no go" gauge described by Michener (1947). If one does want to study variation, then a gauge reading in actual measurements is necessary. Since the variation in small birds extends to only a few tenths of a millimeter, some magnification of the distance between graduations is needed. This is most readily accomplished by a V-gauge which can be made to yield a magnification of 10 or even more. Figure 1 illustrates such a gauge. With one I have measured both the greater diameter (anteroposterior) and the lesser diameter (transverse) at the region of least diameter.

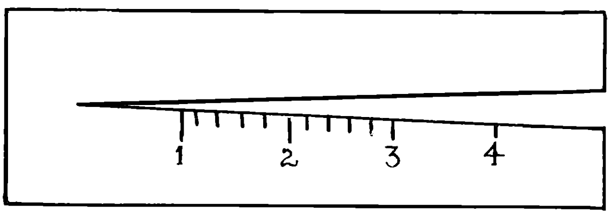

FIGURE I

One practical question has to be answered in the beginning. What is the minimum clearance which should be allowed? The answer I have used is 0.2 mm. or six per cent of the internal band diameter, whichever is larger. The maximum percentage clearance is then about 10 per cent for the Size O band. The range of leg sizes allowable for each band size is shown in Table I.

There are two reasons for allowing some clearance. First, a slightly oversize leg may be banded without harm. Second, bands are often a little out of round and probably vary a bit in size. Some clearance is needed to assure, as far as possible, that a band will rotate on the leg as well as slide up and down.

Tests of the size distributions of legs of several species which afforded rather large samples indicate that the distribution are not quite Gaussian. Examination of the histograms for various species show that the data are concentrated toward the mean and that it is safe to assume that there are no individuals that depart more than three standard deviations from the mean.

TABLE I. CLEARANCES AND LEG SIZES

Size No.	Int. Diam. mm.	Clearance mm.	Leg Size Range mm.
0	2.1	0.2	0 - 1.9
1	2.4	0.2	1.9 - 2.2
1B	2.75	0.2	2.2 - 2.55
1A	3.2	0.2	2.55- 3.0
2	4.0	0.25	3.0 - 3.75
3	4.75	0.3	3.75- 4.45
3A	5.5	0.3	4.45- 5.2
4	6.4	0.4	5.2 - 6.0
5	7.9	0.5	6.0 - 7.4
6	9.5	0.6	7.4 - 8.9
7A	11.1	0.7	8.9 -10.4
7B	12.7	0.75	10.4 -11.95
8	17.5	1.0	11.95-16.5
9	22.2	1.3	16.5 -20.9

It was feasible to construct Table II to use in predicting the proportions of a population which deviate from the mean by no more than the number of standard deviations shown in the columns headed σ. The table runs only to .5000 since one calculates separately on each side of the mean. The present distribution may be regarded as a first approximation which actual experience indicates is better than the Gaussian.

TABLE II. STANDARD DEVIATION VS. PROBABILITY

σ	p	σ	p	σ	p
0.0	.0000	1.1	.4048	2.1	.4928
0.1	.0516	1.2	.4223	2.2	.4949
0.2	.1018	1.3	.4373	2.3	.4965
0.3	.1491	1.4	.4498	2.4	.4976
0.4	.1932	1.5	.4602	2.5	.4984
0.5	.2339	1.6	.4689	2.6	.4990
0.6	.2710	1.7	.4761	2.7	.4994
0.7	.3045	1.8	.4819	2.8	.4997
0.8	.3345	1.9	.4865	2.9	.4999
0.9	.3611	2.0	.4901	3.0	.5000
1.0	.3845				

It will be noted that 99 per cent of all individuals are included in a span of 2.21 6 each side of the mean. This is used in computing the "99% range" in Table III.

In Table III I have summarized the information for those species for which adequate samples (usually 30 or more birds) are available or for which no such sample is likely to be obtained in any reasonable time at my banding station. The band sizes given allow the clearance stated above.

Northern Blue Jay *(Cyanocitta cristata bromia)*. The problem of clearance is well illustrated here. If we assume an exact fit (no clearance) can be accepted then 88 per cent will take size 2 and if we are willing to grant that 0.2 mm. oversize for the leg (i.e. a greater leg diameter of 4.2 mm.) will not result in too much distortion or wear of the posterior lamella then 99 per cent will take a size 2. Whether there are jay populations with larger legs remains to be seen. Size 3 still seems to be the best size until more information is available.

Southern Blue Jay *(C. c. cristata)*. One individual tells us nothing certain but merely suggests a slightly smaller leg size.

White-breasted Nuthatch *(Sitta carolinensis cookei)*. That half the individuals should accept a size 0 band is surprising. The reason is the peculiar shape of the tarsus. In most species the least tarsal diameters occur just above the insertion of the toes. This species has its least diameters near the upper (proximal) end of the tarsus. The greater diameter at the usual place, measured on two birds, averaged 2.4 mm. I therefore recommended using size 1B; there is danger that a smaller band riding high on the leg would tend to jam and injure the leg.

Catbird *(Dumetella carolinensis)*. Size 1A is satisfactory for all individuals.

Brown Thrasher *(Toxostoma r. rufum)*. The best size is 2 which is accepted at exact fit by 93 per cent of birds.

Cedar Waxwing *(Bombycilla cedrorum)*. All individuals at exact fit should take size 1B.

Starling *(Sturnus vulgaris)*. The size 2 band will probably be satisfactory for all birds.

Baltimore Oriole *(Icterus galbula)*. The best size is 1A.

Rose-breasted Grosbeak *(Pheucticus ludovicianus)*. For this species size 1A is certainly correct since only about 1 bird in 5000 would be larger than an exact fit.

Eastern Evening Grosbeak *(Hesperiphona v. vespertina)*. Parks (1952) has discussed the proper band size for this species. In spite of my figures, his proposal to use 1A exclusively is the practical solution. Averaging up the two sets of sizes and recomputing the proportion we find that 73 per cent take 1A and 27 per cent take 2. At exact fit the latter figure becomes two per cent. It would appear that no individual would be more than 0.2 mm. over exact fit and this would only involve some distortion of the posterior lamella if a 1A band were used.

Eastern Purple Finch *(Carpodacus p. purpureus)*. The best solution is to use size 1. This reduces the risk of damage from partial distortion of the band which seems to be accomplished by a very few birds.

Slate-colored Junco *(Junco h. hyemalis)*. This species and the next have average leg sizes on the dividing line between sizes 0 and 1. The junco has a rather low variability and at least 99 per cent will take size 0 at exact fit. This size is recommended.

Eastern Tree Sparrow *(Spizella a. arborea)*. While the population measured can be satisfactorily banded with size 0, I am by no means sure that the sub-species is uniform as to size. More data from other areas are needed.

TABLE III. LEG SIZES AND BAND SIZES

Species	Sample Size	Aver. Greater Diam. & σ	Obs. Range	99% Range	Aver. Lesser Diam.	Obs. Range	Majority Band Size; %	Next Smaller Size; %	Next Larger Size; %
Semipalmated Plover	1	2.3	-	-	1.6	-	1B;	-	-
Spotted Sandpiper	1	2.3	-	-	1.7	-	1B;	-	-
Least Sandpiper	1	1.4	-	-	1.2	-	0;	-	-
Semipalmated Sandpiper	1	1.6	-	-	1.3	-	0;	-	-
N. Flicker	5	3.9 ±0.2	3.7-4.2	3.5 -4.3	2.8	2.5-3.0	3;80	2;20	3A;0.5
N. Crested Flycatcher	2	2.2	2.1-2.4	-	1.5	-	1B;	-	-
E. Phoebe	5	1.65±0.06	1.6-1.7	1.55-1.75	1.2	1.1-1.2	0;100	-	-
Tree Swallow	3	1.6	1.5-1.7	-	1.3	1.2-1.3	0;	-	-
N. Blue Jay	10	3.8 ±0.2	3.4-4.1	3.4 -4.2	2.3	1.9-2.8	3;62	2;38	-
S. Blue Jay	1	3.6	-	-	2.1	-	2;	-	-
Black-capped Chickadee	20	1.65±0.05	1.6-1.7	1.55-1.75	1.1	0.9-1.2	0;100	-	-
White-breasted Nuthatch	6	1.9 ±0.17	1.7-2.1	-	1.2	1.1-1.3	0;50	-	1;48
E. House Wren	5	1.7 ±0.0	1.7-	-	1.1	1.1-1.2	0;100	-	-
Florida Wren	1	2.0	-	-	1.5	-	1;	-	-
Catbird	31	2.8 ±0.11	2.7-3.1	2.6 -3.0	1.7	1.5-2.0	1A;98	1B;0.5	2;1.5
Brown Thrasher	7	3.6 ±0.25	3.1-3.9	3.0 -4.1	2.1	1.9-2.3	2;77	1A;0.2	3;23
E. Robin	26	3.3 ±0.2	3.0-3.7	2.9 -3.7	2.1	1.7-2.4	2;95	1A;4	3;0.5
Wood Thrush	1	2.9	-	-	1.7	-	1A;	-	-
Olive-backed Thrush	2	2.2	2.1-2.3	-	1.3	-	1;	-	-
Bicknell's Thrush	1	2.1	-	-	1.4	-	1;	-	-
Veery	2	2.3	2.3-2.4	-	1.4	1.4-1.5	1B;	-	-
Bluebird	1	2.1	-	-	1.3	-			
Cedar Waxwing	5	2.3 ±0.14	2.1-2.5	2.0 -2.6	1.5	1.4-1.7	1B;79	1;20	1A;1
Starling	5	3.6 ±0.27	3.3-4.0	3.0 -4.2	2.2	2.0-2.6	2;76	1A;0.5	3;23
Blue-headed Vireo	1	1.6	-	-	1.1	-	0;	-	-
Black and White Warbler	1	1.7	-	-	1.0	-	0;	-	-
Tennessee Warbler	1	1.3	-	-	0.8	-	0;	-	-

TABLE III. (CONTINUED)

Species	Sample Size	Aver. Greater Diam. & σ	Obs. Range	99% Range	Aver. Lesser Diam.	Obs. Range	Majority Band Size; %	Next Smaller Size; %	Next Larger Size; %
Golden-Winged Warbler	1	1.5	-	-	0.9	-	0;	-	-
E. Yellow Warbler	1	1.9	-	-	1.1	-	0;	-	1;
Magnolia Warbler	2	1.3	1.2-1.5	-	0.8	0.8-0.9	0;	-	-
Ovenbird	3	2.0	1.9-2.1	-	1.2	1.1-1.2	1;	-	-
Connecticut Warbler	1	2.1	-	-	1.1	-	1;	-	-
N. Yellowthroat	2	1.7	-	-	1.0	-	0;	-	-
Redstart	1	1.5	-	-	0.9	-	0;	-	-
House Sparrow	1	2.7	-	-	1.5	-	1A;	-	-
Baltimore Oriole	6	2.9 ±0.12	2.7-3.0	2.6 -3.2	1.7	1.6-1.9	1A;83	1B;0.01	2;17
Bronzed Grackle	1	4.2	-	-	2.7	-	3;	-	-
Cowbird	4	2.9	2.8 3.2	-	1.6	1.5-1.7	1A;	-	2;
Scarlet Tanager	1	2.7	-	-	1.6	-	1A;	-	-
Florida Cardinal	4	2.9	2.8-3.1	-	1.7	-	1A;	-	2;
Rose-breasted Grosbeak	8	2.8 ±0.14	2.6-2.9	2.5 -3.1	1.7	1.6-1.8	1A;89	1B;2	2;9
Dickcissel	1	2.0	-	-	1.3	-	1;	-	-
E. Evening Grosbeak ♀	62	2.94±0.14	2.5-3.2	2.6 -3.2	1.8	1.5-2.1	1A;74	-	2;26
♂	64	2.93±0.16	2.5-3.3	2.6 -3.3	1.8	1.5-2.1	1A;71	1B;0.25	2;29
E. Purple Finch ♀, etc.	40	1.9 ±0.13	1.6-2.1	1.6 -2.2	1.2	1.1-1.3	0;50	1;50	1B;0.35
♂	31	1.9 ±0.12	1.6-2.1	1.6 -2.2	1.2	1.1-1.2	0;50	1;50	1B;0.16
N. Pine Siskin	34	1.5 ±0.08	1.3-1.6	1.3 -1.65	1.0	0.9-1.2	0;100	-	-
E. Goldfinch	31	1.5 ±0.10	1.3-1.7	1.3 -1.7	1.1	1.0-1.3	0;100	-	-
Red Crossbill	4	2.2	2.1-2.3	-	1.5	-	1B;	1;	-
White-winged Crossbill	1	1.9	-	-	1.4	-	1;	0;	-
Red-eyed Towhee	7	3.2 ±0.1	3.0-3.3	3.0 -3.4	1.8	1.7-1.9	2;99	1A;0.5	-
Slate-colored Junco	30	1.9 ±0.1	1.8-2.3	1.7 -2.1	1.1	1.1-1.2	1;50	0;50	-
E. Tree Sparrow	30	1.9 ±0.12	1.7-2.1	1.6 -2.1	1.2	1.0-1.4	1;50	0;50	1B;0.16
E. Field Sparrow	3	1.8	1.7-1.9	-	1.1	1.1-1.2	0;	-	-
White-throated Sparrow	32	2.5 ±0.09	2.3-2.7	2.3 -2.7	1.4	1.3-1.7	1B;75	1A;25	-
E. Fox Sparrow	3	2.7	2.7-2.8	-	1.5	1.5-1.6	1A;	-	-
E. Song Sparrow	4	2.2	2.1-2.3	-	1.3	1.2-1.4	1B;	1;	-

White-throated Sparrow *(Zonotrichia albicollis)*. The practical solution for this species is to use size 1B.

In conclusion, there is still scope for much more work along this line. We know nothing as yet about subspecific or sexual differences. It is known that nestlings have eventually stouter legs than adults but we know nothing certain about actual sizes or changes with age. I think it probable that most nestlings at banding age will require bands one size larger than those given in Table III. As far as we can go now there is no substitute for good judgment in the selection of band sizes.

References

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Massachusetts Institute of Technology, Cambridge, Mass.

GENERAL NOTES

Leg color of Blackpoll and Bay-breasted Warblers.—Peterson *(Field Guide to the Birds*, 1947, p. 201) states as a distinction between these two warblers that the Blackpoll has yellowish legs and the Bay-breast blackish ones. This puzzled me because a considerable proportion of the fall birds I have handled which gave no evidence of being Bay-breasts had, however, tarsi which were mostly dark brown. Three "text-book" Bay-breasts handled this fall had gray or dark gray legs. The toes are almost the same color as the tarsi. The gray is sometimes lighter than the brown of the Blackpoll. The position seems to be that the Blackpoll has yellow legs with the tarsi more or less obscured by dark brown. In extreme cases there may be no brown. At the other extreme only the ridge of the posterior lamella (less than 1 mm. wide) and the sides and soles of the toes may be light. The real difference is brown versus gray. Field observers will have to draw their own conclusions.—Charles H. Blake, Mass. Institute of Technology, Cambridge 39, Mass.

Six-year-old Tree Swallow.—Tree swallows *(Iridoprocne bicolor)*, in my experience, are rather short-lived birds. During the past eleven years up to this summer only one has returned the fifth year after banding. On June 18, 1953, however, I trapped my second return—5. Banded on July 6, 1948, as an adult male, this bird has returned every year since, being taken this year on June 18. Thus he was then at least six years old.—William P. Wharton, Groton, Mass.

RECENT LITERATURE

BANDING

1. Vogelwarte Cooperators. (Über den Mitarbeiterstab der Vogelwarten.) 1953. F. Goethe and R. Kuhk. *Die Vogelwarte*, **16**(4): 138-143. In celebration of the 60th birthday of Dr. Rudolf Drost, Director of Vogelwarte Helgoland, the spring 1953 number of *Die Vogelwarte* is a jubilee issue. Germany has two major ornithological stations, the functions of which are somewhat similar to those of the Patuxent Research Refuge. Vogelwarte Helgoland and Vogelwarte Radolfzell are not only national banding centers, but also conduct and direct studies on migration, ecology and conservation of birds. This paper deals with German banders, tabulates the walks of life from which they come, and attempts to answer the question, "Why do they band?"—Frances Hamerstrom.