

GEOGRAPHIC VARIATION IN THE WHISKERED AUKLET

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The Whiskered Auklet, *Aethia pygmaea* (Gmelin), is a small alcid (about seven inches long) of a generally blackish color, adorned with three long tufts of white feathers projecting from the sides of the head, as well as a conspicuous recurved crest. So far as known, it breeds only on the islands between northern Asia and Alaska (the Kurile, Komandorskie and Aleutian Islands), and apparently winters in the same general area and off the adjacent coast of Kamchatka Peninsula. It has hitherto been considered a monotypic species.

While handling some specimens of the Whiskered Auklet in the United States National Museum collections, I noted that examples from the Kurile Islands (between Japan and the Kamchatka Peninsula) were larger in size and lighter in color than those from the Aleutian Islands. A search of the literature showed that Ridgway (1919: 772) had tabulated the specimen measurements, and arranged them according to their geographical localities. The east (Aleutian) to west (Kurile) disposition of these data showed the size increase I had independently observed.

MATERIAL EXAMINED

Additional specimens were then borrowed to supplement the original material and in all some 74 specimens were amassed.

Of this total, 56 specimens were adults: 9 coming from Kurile Island localities; 31 from Komandorskie Island localities; 16 from Aleutian Island localities. The remaining 18 specimens comprised 3 downy young and 15 immature birds, one immature from the Kurile Islands and one from the Komandorskie Islands. The other 13 specimens were from Aleutian Island localities.

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DISCUSSION

The Whiskered Auklet is a comparatively early breeder. What little information is available of its breeding habits comes from observations by Stejneger (1885: 25) on Copper Island in the Koman-

dorskies group. He noted that the breeding birds required sites on steep rocky shores and that on the Komandorskie Islands the downy young were present by the end of June. More recently Gizenko (1955: 80) has corroborated all this.

Examination indicates the Komandorskie Islands to be an area of intergradation between the eastern and western populations. The majority of the Komandorskie Islands specimens are like the Kurile birds. Arranging the Komandorskie Islands specimens by their color characters results in a graduated series, the extremes of which approach the terminal forms but are not quite typical of them. The specimens can then be re-sorted upon their dimensional characters, and again a series is produced with the extremes falling within the ranges of the terminal forms. Therefore the terminal populations are separated by two characters, size and color. Birds from the Kurile Islands differ from the Aleutian Islands' birds in averaging larger, particularly in wing length (111.9 mm. against 103.7 mm.), in being browner (less slaty) above, and in having the breast more sharply demarcated from the white of the abdomen.

MEASUREMENTS

For the proper application of statistical methods, it is deemed best to use quantitative units to determine the significance of difference between two samples. The figures presented in Table I reveal that

TABLE I

Population	No. Specs.	Wing ¹			σ
		Wing Range	Mean	σM	
Aleutian Islands	16	99.4-108.1	103.76 \pm 0.75	3.01	
Komandorskie Islands ²	31	102.0-112.0	107.30 \pm 0.47	2.71	
Kurile Islands	9	109.2-115.4	111.98 \pm 0.72	2.16	

Population	No. Specs.	Tail			Culmen ³		
		Mean	σM	σ	Mean	σM	σ
Aleutian Islands	16	28.99 \pm 0.32	1.29	1.29	9.21 \pm 0.11	0.42	
Komandorskie Islands	31	29.70 \pm 0.31	1.73	1.73	9.28 \pm 0.90	0.48	
Kurile Islands	9	30.62 \pm 0.45	1.34	1.34	9.60 \pm 0.11	0.33	

Population	No. Specs.	Tarsus			Middle toe without Claw		
		Mean	σM	σ	Mean	σM	σ
Aleutian Islands	16	21.14 \pm 0.23	0.91	0.91	22.94 \pm 0.30	1.20	
Komandorskie Islands	31	21.37 \pm 0.14	0.80	0.80	23.52 \pm 0.20	1.08	
Kurile Islands	9	22.15 \pm 0.18	0.53	0.53	24.36 \pm 0.27	0.82	

¹ Measure of the chord. σ is the standard deviation. σM is the standard error of the mean.

² St. Lawrence Island specimen included.

³ Determined on 28 specimens from the Komandorskie Islands.

only the wing lengths show a mensural difference having statistical significance. It is axiomatic, in determining the difference of measures of samples, that if the sum of the standard deviations of the samples is less than the difference of the means of the samples, then five-sixths of the samples can readily be distinguished from each other. Applying this to the Table I figures for the wing measurements we have:

<i>Population</i>		<i>Difference of the means Ma - Mb</i>	<i>Summation of the standard deviations $\sigma a + \sigma b$</i>
Kurile	Aleutian	8.22	5.17
Kurile	Komandorskie	4.68	4.87
Komandorskie	Aleutian	3.54	5.72

The combination of measurements reveals that the only significant difference occurs between the two most widely separated samples.

The sexes are combined in Table I because it was found that there was no statistically significant difference in the wing measurements of the two sexes (Table 2).

TABLE 2

<i>Wing</i>						
<i>Population</i>	<i>Sex</i>	<i>No Specs.</i>	<i>Wing Range</i>	<i>Mean</i>	<i>σM</i>	<i>σ</i>
Aleutian	male	9	99.4-108.1	102.80 ± 0.87		2.6
	female	5	97.3-106.0	101.90 ± 1.20		3.6
	unsexed	2	101.5, 102.0			
	male	15	103.5-112.0	107.48 ± 0.63		2.4
Komandorskie	female	14	102.0-112.0	107.07 ± 0.83		3.1
	unsexed	2	106.6, 108.5			
	male	2	110.2-113.0	111.60 ± 0.99		1.4
Kurile	female	3	110.0-115.4	112.43 ± 1.28		2.7
	unsexed	4	109.2, 115.3			

COLOR

The Aleutian birds can be distinguished from the Kurile birds on color alone. To make certain that the browner color of the Kurile birds was a constant difference, and not the result of age (foxing) or season, suitable comparisons were made. Examination of adults from the Aleutian Islands indicated that the greatest difference in color was due to the effects of wear and abrasion. The specimens in best plumage condition, those collected in April, appeared quite different from the breeding and moulting birds. The latter specimens had a brown tone due to the wear of the feather tips. A similar brown coloration was noted in several specimens that had been on exhibition and had been exposed to illumination. In specimens

undergoing moult, it was apparent that the color values of the new feathers were equal to those in the fresh plumage birds. As far as pigment deterioration is concerned, the series studied shows very little. For example, an adult male collected in May or June, 1879 at Atka Island in the Aleutians (USNM 85617) is of similar color to the more recently collected adult male specimens of various June, 1936 dates from other Aleutian Island localities (USNM 366541, 366542, 366544, 366545). The same holds true for the females. The Kurile Islands population similarly follows this pattern, even though the series of specimens is small. The entire breeding series, Aleutian and Kurile, indicate, with one exception, no color alteration within their respective groups; the exceptional case is an adult female collected in the Kurile Islands in late May, 1918 (AMNH 11120). It is in a plumage comparable to that of the April specimens, which manifest no wear at all.

SUBSPECIES

Through mensural analysis and by visual examination, the Whiskered Auklet has been determined to be composed of two morphologically distinct populations, an Aleutian Island population and a Kurile Island population, the descriptions of which follow:

Aethia pygmaea pygmaea (Gmelin)

Alca pygmaea Gmelin, Syst. Nat., 1, (2), p. 555, 1789. Based on the Pygmy Auk, Pennant, Arct. Zool., vol. 2, p. 513, 1785. ("circa insulam avium inter Asiam septentrionalem et Americam.") = St. Matthew Island.

Description.—Summer Adult (sexes similar). Colors based on Ridgway's Color Standards (1912). Head and neck black, shading to slate color on rump, back and upper tail coverts; upper surfaces of rectrices chaetura black; sides of head, except lores, chaetura black; lores white; throat and upper breast chaetura black, grading to deep mouse gray on lower breast and flanks; abdominal area pale smoke gray, changing to white on the under tail coverts; primaries fuscous-black; bill (dried skins) red, the tip yellowish; feet, webs and tarsi (dried skins) averaging brownish; ornamental tufts white; except for the black frontal crest. The winter adult plumage similar to that just described, bill brown.

The immature plumage like that of the adult, except for the absence of filamentous plumes, and lack of bright bill color; bill dark. The downy young entirely covered with fuscous down feathers, lighter on the under surface than the upper surface.

Measurements.—Adult male (9 specimens), wing (chord) 99.4–108.1 (102.8); tail 26.5–30.1 (28.9); culmen 8.4–10.0 (9.2); tarsus 19.2–23.1 (21.3); middle toe without claw 21.4–25.6 (23.3); frontal crest (extended at right angles to base) 34.6–47.2 (39.3) mm. Adult female (5 specimens), wing 97.3–106.0 (101.9); tail 28.2–30.4 (29.2); culmen 9.0–9.7 (9.3); tarsus 20.1–22.0 (20.7); middle toe without claw 22.2–23.3 (22.8); frontal crest 28.2–40.0 (33.9) mm. Unsexed (2 specimens), wing 101.5, 102; tail 26.2, 30.9; culmen 9.1, 9.2; tarsus 21.0, 22.9; middle toe without claw 20.3, 23.0 mm.

Specimens examined.—Alaska: 1 ad., Bethel, no date; 1 imm., no data; Aleutians:

Atka Island, 1 ♂ ad., May or June, 1879; 3 ♀ ads., April, 1924; imm., no date; Akun Island: 1 ad., Feb., 1922; 2 imm., Aug., 1901; Akutan Island: 3 imm., Sept., 1874 and Aug., 1901; Amchika (= Amchitka) Island: 2 imm., July and imm., Aug. 1873; Chugulak (= Chagulak) Island: 1 ♂ ad., June, 1936; Gareloi Island: imm., Aug., 1901; Herbert Island: 2 ♂ ads. and 1 ♀ ad., June, 1936; Kagamil Island: 1 ♂ ad., June, 1936; Kiska Islands, Kiska Harbor: 1 imm., no data; Unalaska Island, Dutch Harbor: 1 ♂ ad., June, 1901; Unamak (= Unimak) Island: 1 imm., no data; Unalga Pass: 2 ♂ ads. and 1 ♀ ad., Oct., 1931.

Range.—The Aleutian Islands from Akun Island west to the Rat Islands; one record from Bethel, Alaska.

Remarks.—The Bethel specimen (ANS 35095) is referable to the Aleutian population and is probably a wanderer from one of the Islands.

The Committee on Classification and Nomenclature of the American Ornithologists' Union (1957: 255) restricts the name *Aethia pygmaea* (Gmelin) to the "Islands in Bering Sea." This is based upon Gmelin (1789: 555), who cites the description of the Pygmy Auk by Pennant (1785: 513). Pennant states that the Pygmy Auk was seen "in vast multitudes" about "Bird Island", which was visited by Captain Cook on his last voyage. Since two distinct forms of the Whiskered Auklet are here recognized, it is necessary to determine whether *pygmaea* refers to the Aleutian or to the Kurile form.

Stresemann (1949: 246, 251) has identified the Bird Island of Captain Cook's last voyage, referred to by Pennant, as St. Matthew Island in the Bering Sea, formerly known as Gore Island. Unfortunately, the type specimen no longer exists (Stresemann, 1949: 247-248), so there is no way of knowing whether it belonged to the Aleutian population, the intermediate Komandorskje population, or the distinct Kurile population. The recognition of two distinct forms of Whiskered Auklet makes it necessary to assign Gmelin's name to one or the other race. As St. Matthew is an American island, north of the Aleutians, the probability is that the type belonged to a population like that of the Aleutians rather than that of the distant Kuriles. I therefore use *pygmaea* as the name of the Aleutian form. Should it be determined that the Whiskered Auklet breeds on St. Matthew and is subspecifically distinct, another name would have to be found for the Aleutian population.

The restriction of *Aethia pygmaea pygmaea* to the Aleutian Islands form would seem to leave the Kurile Islands population without a name. A search of the synonymy produced an available name. Lepechin (1801: 369) described a new alcid from Kamchatka, for which he proposed the name *Alca Camtschatica*. It is the oldest available name for the Whiskered Auklet with a definite Asiatic locality, Kamtchatka. There is a possibility that the specimen described originated in the Komandorskje or Aleutian Islands, but if the specimen had been collected on the islands in the Bering Sea, that fact would probably have been noted, since most of the islands were known by this time. Lepechin gives the distribution of his species as ranging from the islands between America and Kamchatka itself. In view of the name he gave to it, I am inclined to believe that the specimen Lepechin described came directly from the coasts of Kamchatka, or possibly from one of the northernmost Kurile Islands, which are separated from the Kamchatka Peninsula by a distance of only a few miles. I designate Kamchatka as the type locality. This species is abundant in the waters about the tip of Kamchatka, and according to Clark (1910: 32) and Dybowski (1884: 3) it occurs off the Kamchatkan coast.

While the diagnostic characters noted by Lepechin in his description are of little value in determining the population to which his specimen belonged, the illustration which supplements the text contains characteristics indicative of the Kurile population. The illustration shows a specimen with long ornamental crests, brownish flanks and breast and a restricted white abdominal area. This latter character is rather consistent in the Kurile group. The coloring of the breast does not continue into the abdominal area so that there is a line of demarcation which is not found in the Aleutian skins.

An incidental problem arising with the resurrection of the name concerns its correct spelling. In the text, the description is entitled, *Alca Camtschatica* (Lepechin, 1801: 369), while the plate is entitled *Alca Kamtschatica* (1801: after p. 104). The specific name containing the initial *C* appears only once, in the title of the article. In the text, the land area, Kamchatka, is spelled with an initial *K*. It seems probable that Lepechin intentionally attempted to latinize the name of the area by using *C* in the spelling of the specific name. The specific name accompanying the plate may have been inserted by someone other than Lepechin. The displacement of the plate by several hundred pages from the text is believed to have been a matter of facilitating the binding of the volume, in which all the illustrations occur in one portion of the volume. It was the consensus of inquiries into this problem that the name accompanying the text was the available one.

The Kurile Islands population is then characterized as:

Aethia pygmaea camtschatica (Lepechin)

Alca Camtschatica Lepechin, Nova Acta Academiae Scientiarum Imperialis Petropolitanae, tom. 12, pl. 8, p. 369, 1801. ("In insulis inter American Septentrionalem et Kamtschatcam sitis." = Kamchatka.)

Description.—Differs from *Aethia pygmaea pygmaea* in being browner, less blackish and averaging larger in all respects; significantly longer wing; white abdominal area sharply demarcated from brown of breast; head and neck blackish-brown, shading to dark neutral gray on back, rump and upper tail coverts; upper surface of rectrices chaetura black; sides of head, except lores, blackish-brown; lores white; throat and upper breast fuscous-black; lower breast and flanks hair brown; under tail coverts and abdomen white; primaries fuscous; bill (dried skins) red, the tip yellowish; feet, webs and tarsi (dried skins) averaging brownish; ornamental crests white, except for blackish frontal crest.

Measurements.—Adult male (2 specimens), wing 110.2–113.0 (111.6); tail 31.0–33.5 (32.2); culmen 9.1–9.7 (9.4); tarsus 23.0–23.1 (23.05); middle toe without claw 24.3–25.1 (24.7); frontal crest 46.2–52.0 (49.1) mm. Adult female (3 specimens), wing 110.0–115.4 (112.4); tail 28.1–31.0 (30.1); culmen 9.5–10.2 (9.8); tarsus 21.3–22.0 (21.7); middle toe without claw 24.3–26.1 (25.3); frontal crest 48.2–53.1 (49.8) mm. Unsexed adults (4 specimens), wing 109.2–115.3; tail 30.0–31.2; culmen 9.1–9.9; tarsus 22.0 (4); middle toe without claw 23.2–25.0 mm.

Specimens examined.—Kurile Islands: 1 ♂ ad., June; 1 ♂ ad., May, 1901; 3 ♀ ads., 1 no date; 1 May, 1918; 1 July, 1884; 3 unsexed ads., no dates; 1 unsexed ad. Japan, no date; 1 imm., no date; 1 unsexed ad., summer of 1882. Komandorskie Islands; Bering Island: 1 ♀ ad., May, 1883; 1 imm., Aug., 1882; Copper Island: 2 ♂ ads. and 3 ♀ ads., Jan., 1883; 1 ♀ ad., Jan., 1911; 1 ♀ ad., Jan., 1916; 1 ♂ ad., Feb., 1911; 1 ♀ ad., Feb., 1916; 1 ♂ ad., Mar., 1883; 1 ♀ ad., Mar., 1912; 1 ♂ ad., May, 1912; 1 ♂ ad., 1 ♂ imm., June, 1883; 1 ♀ ad., June, 1911; 1 ♂ ad., July, 1882; 1 ♂ ad.,

July; 1 ♂ imm., July, 1883; 1 ♀ ad., July, 1883; 1 ♂ ad., Oct., 1910; 1 ♀ ad., Oct., 1915; 1 ♂ ad., Nov., 1915; 1 ♀ ad., Nov., 1912; 1 ♂ ad., Dec.; 1 ♂ ad., Dec., 1883; 1 ♂ ad., Dec., 1884; 1 ♂ ad., Dec., 1911; 1 ♂ ad., Dec., 1913; 1 ♀ ad., Dec., 1882; 1 ♀ ad., Dec., 1911.

Range.—The Kurile Islands, north along the Kamtchatkan coast (not breeding) (Dybowski, 1882) and east, intergrading in the Komandorskie Islands; irregularly occurring on southern Sakhalin Island (Aniwa Bay). One specimen from St. Lawrence Island, Bering Sea, approaches this form.

Remarks.—Bergman (1935: 149) makes note of a specimen supposedly taken in Awatscha (= Avacha) Bay, Kamchatka. There is no date of collection given. The appearance of literature references to this species occurring in the main Japanese Islands are doubtful. One of the specimens examined has the locality Japan written on the label. It was collected by H. Pryer and is more than probable that it came from the Kuriles, which at that time were part of the Japanese Empire. Two specimens are recorded by Gizenko (1955: 101) from Nagasaki, Japan collected by Polyakov on February 14, 1883. As with the preceding specimen it is more than likely that these specimens came from elsewhere in the Japanese Empire. The Whiskered Auklet appears to have a definite affinity for a certain type of habitat. As pointed out in the discussion (see above), the bird is more or less selective for locations which have steep and rocky shores. To my knowledge no specimen has been taken from any area where these conditions do not prevail.

In the Hand-list of Japanese Birds (1942: 171) records are given for the islands of Hondo (= Honshu) and Shikoku. Austin and Kuroda (1953: 461) have traced the Hondo Island records. These represent two specimens taken by the Perry Expedition and identified by Cassin as *Uria mystacea* Pallas. Later the binominal he used was placed into the synonymy of the Whiskered Auklet. One of these specimens is now in the United States National Museum collection and is identified as *Aethia cristatella* (Pallas). The other Perry Expedition specimen has been lost and is believed to be *cristatella* by Austin and Kuroda. They could find no trace of the records from Shikoku Island. The most recent Hand-list of Japanese Birds (1958: 236) accepts the arguments of Austin and Kuroda for deleting the records for Japan. The Hand-list also cites a record for Honshu (Miyagi-Vogel, No. 15: 31, 1957). This is the only record I know of from the islands of Japan. The status of this species in Japan is that of a very rare straggler, as the Hand-list states.

The records of the Whiskered Auklet from St. Lawrence Island are quite sparse, three being known. The only specimen I have examined, one in the U.S. Nat. Mus. collection, taken at Gambell in July, 1931, by a native, P. Silook, is an intermediate bird and shows a greater affinity to the Kurile population than to the Aleutian one. On the reverse side of the label is written ". . . never seen before." Friedmann (1932: 28) notes that Choris obtained several specimens from the natives of the island, and that Ridgway left the status of the bird there open to question. Dementiev (1951: 221) and Kozlova (1957: 135) list St. Lawrence Island as a breeding area. The scarcity of records from the locale, added to the fact that the bird was unknown to a native collector in 1931, suggests that this island is one rarely visited rather than a breeding ground.

SUMMARY

A study of the Whiskered Auklet, *Aethia pygmaea* (Gmelin), revealed a clinal distribution throughout its range. In measurements

the smaller end of the cline has its terminus in the Aleutian Islands, the larger end of the cline has its terminus in the Kurile Islands. The latter are also browner (less slaty black) than the Aleutian birds.

The specimens from the Komandorskie Islands (a breeding area) and from St. Lawrence Island are intermediate, being closer to the Kurile population.

The ends of the cline, being distinct in several morphological characters, may be called *Aethia pygmaea pygmaea* (Gmelin) and *Aethia pygmaea camstchatica* (Lepechin).

LITERATURE CITED

- AMERICAN ORNITHOLOGISTS' UNION COMMITTEE. 1957. Check-list of North American Birds (Fifth ed.). i-xiii + 691 pp.
- AUSTIN, O. L., JR. and N. KURODA. 1953. The birds of Japan, their status and distribution, *Bull. Mus. Comp. Zool.*, 109, No. 4: 279-637.
- BERGMAN, S. 1935. Zur Kenntnis Nordostasiatischen Vogel, Stockholm, 268 pp.
- CLARK, A. H. 1910. Birds of the 1906 "Albatross" Cruise, *Proc. U.S. Natl. Mus.*, **38**: 25-74.
- DEMENTIEV, G. P., A. N. GLADKOV, *et al.* 1951. Birds of the Soviet Union, vol. 2, Moscow, 480 pp.
- DYBOWSKI, B. 1882. Observations sur les Oiseaux de la Famille des Mormonides, *Bull. Soc. Zool. Fr.*, **7**, pp. 290-300.
- DYBOWSKI, B. and L. TACZANOWSKI. 1884. Liste des Oiseaux du Kamtschatka et des Iles Comandores, *Soc. Zool. France*, **9**: 1-17.
- FRIEDMANN, H. 1932. Birds of St. Lawrence Island, Bering Sea, *Proc. U.S. Natl. Mus.*, **80**, art. 12, pp. 1-31.
- GIZENKO, A. I. 1955. Birds of the Sakhalin Oblast, Moscow, 326 pp.
- GMELIN, J. 1789. *Systema Naturae*, tom. 1, pt. 2.
- KOZLOVA, E. V. 1957. Fauna of the U.S.S.R., Birds, vol. 2, No. 3, *Zool. Inst. Acad. Sci. U.S.S.R.*, Leningrad, 1957.
- LEPECHIN, J. 1801. *Nova Acta Academiae Scientiarum Imperialis Petropolitanae*, tom. 12, tab. 8, pp. 369-371.
- ORNITHOLOGICAL SOCIETY OF JAPAN. 1942. Hand-list of the Japanese Birds (3rd ed.), Tokyo Imper. Univ., 238 pp.
- ORNITHOLOGICAL SOCIETY OF JAPAN. 1958. Hand-list of the Japanese Birds (4th ed.), Tokyo, Japan, 264 pp.
- PENNANT, T. 1785. *Arctic Zoology*, vol. 2, London, 411 pp.
- RIDGWAY, R. 1912. *Color Standards and Color Nomenclature*, Wash., D.C., 43 pp., 53 pls.
- RIDGWAY, R. 1919. The Birds of North and Middle America Pt. 8, *U.S. Natl. Mus. Bull.*, **50**, 582 pp.
- STEJNEGER, L. 1885. Ornithological Explorations in the Commander Islands and in Kamtschatka, *U.S. Natl. Mus. Bull.* **29**, 382 pp.
- STRESEMANN, E. 1949. Birds Collected in the North Pacific Area during Capt. James Cook's last Voyage (1778 and 1779), *Ibis*, **91**: 244-255.

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