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Source: Waterbirds, 35(1) : 64-73

Published By: The Waterbird Society

URL: https://doi.org/10.1675/063.035.0107

Rare Inter-ocean Vagrancy in Crested Auklet and Parakeet Auklet

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Abstract.—Two specimens of adult Crested Auklet (*Aethia cristatella*) have been taken at sea in the North Atlantic Ocean: (1) near Iceland in August 1912 and (2) near Nuuk (formerly Godthåb), southwest Greenland between 1986 and 1972. An adult Parakeet Auklet (*A. psittacula*) was taken at Lake Vättern, Sweden in December 1860. These rare inter-ocean vagrants probably traveled from the Chukchi Sea east through the Canadian Arctic Archipelago to the Atlantic Ocean and may have arrived long before they were collected. Breeding distributions, limited post-breeding movements, weather patterns, timing and plumage of Atlantic and Pacific vagrants, small number of Atlantic vagrant records and the lack of inland records of these species east of Alaska in North America, support this route. Information about rare occurrences of auklets in the Atlantic Ocean enhances our knowledge of overall patterns of rare long-distance vagrancy versus more frequent vagrancy in alcids and other seabirds. *Received 11 May 2011, accepted 7 November 2011.*

Key words.—*Aethia cristatella*, *Aethia psittacula*, Atlantic Ocean, Crested Auklet, long-distance vagrancy, non-breeding, Pacific Ocean, Parakeet Auklet, routes.

Waterbirds 35(1): 64-73, 2012

Frequent long-distance vagrancy of species in the Procellariiformes, often involving inter-ocean travel, has been well documented (Bourne 1967). Less attention has been focused on vagrancy in the Alcidae. Most well known are the extensive movements from the Pacific Ocean into the interior of North America by Ancient Murrelets (*Synthliboramphus antiquus*: e.g. Munyer 1965; Sealy *et al.* 2001) and Long-billed Murrelets (*Brachyramphus perdix*: e.g. Sealy *et al.* 1991; Mlodinow 1997; Svingen 2009). Incursions of large numbers of Thick-billed Murres (*Uria lomvia*) and Dovekies (*Alle alle*) to waters south of the normal wintering ranges in the north Atlantic Ocean, and wind-driven individuals moving inland in eastern North America, are similarly well described (e.g. Murphy and Vogt 1933; Gaston 1988; Sealy and Carter 2004a) .

Long-distance vagrancy elicits questions about the (1) age, sex and condition of the vagrants, (2) weather and other factors that possibly promoted and assisted the birds' movements, and (3) geographic origin and routes travelled. Explanations for this vagrancy are usually speculative, however, because single individuals or at most small numbers of individuals are involved, and often these are recorded years apart. In some cases, however, scrutiny of the circumstances surrounding individual records of vagrancy has provided answers to some of these questions (e.g. Bourne 1967; Dixey *et al.* 1981; Maumary and Knaus 2000). The Parakeet Auklet (*Aethia psittacula*) and the Crested Auklet (*A. cristatella*) are among five species of "Pacific" alcids recorded, albeit rarely, in the Atlantic Ocean. We re-examined the circumstances of the records of these auklets and augmented this information through study of the plumages of the two specimens of Crested Auklet and one of Parakeet Auklet taken in the Atlantic Ocean. We aged each specimen based on characteristics of the plumage and provided support for a hypothesized route from the Pacific Ocean to the Atlantic Ocean. We obtained for comparison information pertaining to records of vagrancy by the Crested Auklet south of the range on the west coast North America and aspects of the non-breeding distribution of the Parakeet Auklet.

Methods

Details of records of vagrant auklets in the Atlantic Ocean and the Pacific Ocean were obtained from the literature, augmented with information from online

databases, ORNIS (Ornithological Information System) and eBird (CLO and NAS 2011). SGS examined auklet specimens to identify age and derive information on body condition of vagrants and other specimens collected within the normal range, at or on loan from several museums: California Academy of Sciences (CAS), San Francisco; Cowan Museum of Vertebrate Zoology, University of British Columbia (UBC), Vancouver; Field Museum of Natural History (FMNH), Chicago; Naturhistoriska Riksmuseet (NRM), Stockholm; Royal British Columbia Museum (RBCM), Victoria; Universitetets Zoologiske Museum (ZM), Copenhagen; University of Alaska Museum (UAM), Fairbanks; University of Manitoba Zoology Museum (UMZM), Winnipeg; and University of Washington Burke Museum (UWBM), Seattle.

Pyle's (2008, 2009) descriptions of plumages of auklets were followed and supplemented by information from Bédard and Sealy (1984) and Jones (1993a). Ages of birds were referred to by the following abbreviations: HY (hatch-year - < 6 months old), SY (second-year - 6-18 months), AHY (after-hatch-year or adult - > 6 months), and ASY (after-second-year or adult - > 18 months). Plumages were referred to as juvenile (HY), second-year (SY), basic (AHY), or alternate (ASY). At least one specimen catalogued in a museum collection was matched with the plumage of each vagrant in Table 1.

Minimum distances (rounded to the nearest 100 km) from hypothesized points of origin to vagrant locations were determined using an online distance calculator (maps of.net/distance-calculator / North_America). This approach produced straight-line distances between a point in the eastern Chukchi Sea in northwest Alaska to points off the southern tip of Greenland and Sweden, and from a point in the Bering Sea (Pribilof Islands) across northern Eurasia to southern Greenland and Sweden.

RESULTS

Crested Auklets in the Atlantic Ocean

Iceland.—The first record of Crested Auklet in the Atlantic Ocean was a specimen collected northwest of Iceland in August 1912 (Hørring 1933). During a visit to the Universitetets Zoologiske Museum (ZM), Copenhagen, in 1984, SGS examined the mounted specimen (ZM 2.3.1934. C.N.1), which had been collected by shipmaster O. A. Christiansen between 12 and 20 August 1912, about 46 nautical miles (74 km; 66°48'N, 12°55'W) off the tip of Langanes Peninsula, Iceland (original documentation and photograph in Hørring 1933; also see Jourdain 1936; Fisher and Lockley 1954; Pettersson 1987). The bird was an adult in its definitive cycle (Pyle 2009; definitive alternate plumage of Bédard and Sealy [1984]) and was not molting; the remiges were abraded and faded (Fig. 1), typical of adults near or at the end of the breeding season (Jones 1993a; SGS, personal observations). The bill, including the ornamental rictal processes, was bright orange; white post-ocular plumes were present as well as 13 frontal plumes, less than means for adult males (26 plumes) and for adult females (23 plumes) during the breeding season; and the longest frontal plume was 40 mm, compared with means of 43 mm for adult males and 39 mm for adult females (Table 1 in Bédard and Sealy 1984). The depth of the bird's bill was less than its length, which suggests a female (see Figure 1 in Jones 1993b; compare E and F in Figure 551 of Pyle [2008: 779]). A female (UMZM 1166) taken at a colony on St. Lawrence Island, Bering Sea on 2 July 1966, early in the chick-rearing period that year (Sealy 1975), was of comparable plumage (ASY), except its remiges were less worn.

Greenland.—During the same visit to the ZM in 1984, Jon Fjeldså showed SGS a specimen of Crested Auklet (ZM 64174, 14-9-1983-15) taken in Greenland several years earlier that was not reported in the literature until Boertmann (1994) included it in a list of new avifaunal records for Greenland. The specimen was among a small collection of rare birds taken in Greenland and donated to the ZM by J. Kreutzmann in 1972 (Boertmann 1994). Notes made on this specimen at the time of accession by the late Finn Salomonsen, translated by Kaj Kampp (*in litt.* to SGS, 23 October 1984), indicated these specimens were taken from western Greenland, probably near Nuuk (formerly Godthåb, 64°11'N, 5°45'W), between 1968 and 1972, about 70 years after the specimen was taken near Iceland in 1912. The auklet was a female; its ovary was granular with minute follicles; and the bird weighed 265 g, within the normal range of breeding adults (Bédard 1969). The plumage was fresh and the remiges were unworn (Fig. 2); white post-ocular plumes and nine frontal plumes were present; and six frontal plumes were 42

Table 1. Specimens of Crested Auklet and Parakeet Auklet collected in the North Pacific Ocean following the breeding season. Collection locations are: CAS – coastal California; UBC – St. Lawrence Island and Chukchi Sea near Barrow, Alaska; FMNH – Chukchi Sea near Barrow, Alaska; UMZM – St. Lawrence Island, Alaska; and UWBM - drift-net by-catch off Aleutian Islands, Alaska (acronyms for museum collections in the Methods).

Catalogue	Year	Month & Day	Age[1]	Sex	Plumage & Notes[2]
Crested Auklet					
FMNH 159113	1927	Oct 7	Adult (ASY)	Unk	alternate plumage (heavy body and wing molt, p9 and p10 old, p1 - p8 incoming); most rictal plates shed, frontal feathers being replaced
FMNH 159111	1928	Jul 17	Adult (ASY)	♀	alternate plumage (no molt); remiges worn, bill plates and rictal processes intact, longest frontal feather 47 mm
FMNH 159114	1928	Jul 17	Adult (ASY)	♂	alternate plumage (no molt): remiges worn, bill plates and rictal processes intact, longest frontal feather, 28 mm
FMNH 159115	1932	Oct 3	Adult (ASY)	♂	alternate plumage (molt); remiges new, bill plates and rictal processes gone, frontal feathers being replaced
UMZM 1166	1966	Jul 2	Adult (ASY)	♀	alternate plumage; incubation patches half refeathered, no molt but remiges and rectrices lightly worn
UBC 13404	1967	Aug 29	Juvenile (HY)	♀	juvenile plumage (no molt); comparable to Plate IIb of Bédard & Sealy (1984: 469)
UWBM 43258	1986	Jun 24	Adult (ASY)	♀	failed breeder, incubation patches refeathered; feathers from lores to rump mainly new (as in CAS 70170)
UWBM 43259	1987	Jul 12	Adult (ASY)	♀	failed breeder (early onset of molt); incubation patches half refeathered: lores (old) but feathers from forehead to upper tail coverts new (similar to CAS 70170), remiges being replaced, rectices new (differs from CAS 70170), post-ocular plumes intact, 12 frontal plumes of various lengths, bill plates gone (mandible, maxilla orange with yellow tips), rictal processes present
UWBM 51224	1992	Mar 2	Adult (ASY)	♂	basic plumage with light body molt; plumage fresh, post-ocular plumes present, 17 frontal feathers of various lengths, bill plates and rictal processes gone
Parakeet Auklet					
CAS 10304	1908	Jan 30	Adult (ASY)	♂	basic plumage (no molt)
FMNH 159110	1932	Oct 3	Adult (ASY)	♀	alternate plumage, heavy body and wing molt (p9 and p10 old, p1 – p8 incoming); bill plates shed
UBC 9971	1958	Jun 9	Subadult (SY)	♀	first alternate plumage (no molt); bill yellowish, no plates

[1]Codes: HY, hatch-year; SY, second-year; AHY, after-hatch-year; ASY, after-second-year.
[2]P refers to a numbered primary feather (e.g. p9 for primary 9).

Figure 1. Crested Auklet (ZM 2.3.1934. C.N.1) taken northwest of Iceland between 12 and 20 August 1912. Note the worn primaries.

mm long, within the range of adults breeding in the northern Bering Sea but longer than in subadults (Table 1 in Bédard and Sealy 1984: 464). The bill was black with a hint of pale orange on the mandible, typical of SY adults in late fall of their second year after hatching (Jones 1993a; Pyle 2009). This bird's ornamental plumes had developed during the prebasic molt, in the definitive cycle that is equated to twelve months of age or older (Pyle 2009). A male (UWBM 51224) taken at sea off Unimak Island, Aleutian Islands on 2 March 1992, was of comparable age (SY) and plumage, except with slightly more orange visible on the bill, as expected closer to the breeding season (Table 1).

Figure 2. Crested Auklet (ZM 64174, 14-9-1983-15) taken in southwest Greenland between 1968 and 1972.

Massachusetts.—An early record of Crested Auklet from Massachusetts has never been confirmed (e.g. Bent 1919; Salomonsen 1944; Fisher and Lockley 1954). During the "winter of 1884-'85", a bird killed at sea off Chatham (Forbush 1925: 35) was described by a fisherman to J. A. Allen "as being very much like the Little Auk or Dovekie [*Alle alle*] . . . in form and color, though a little larger, and having a tuft of narrow pointed feathers on the front of the head, curving upward and forward" (Allen 1885: 388). The frontal crest and small body size suggested a Crested Auklet but not its color and pattern. No other documentation was available and a specimen apparently was not preserved. Forbush (1925) acknowledged this record in his comprehensive treatise of the birds of Massachusetts but he considered it unacceptable and did not include it among the list of birds known to have occurred in Massachusetts.

Parakeet Auklet in the Atlantic Ocean

The sole occurrence of Parakeet Auklet in the Atlantic Ocean was documented with a specimen taken on Lake Vättern, Sweden in 1860 (Wahlgren 1867). Dalgleish (1880) erroneously referred to this bird as a Crested Auklet and included it in a list of North American birds that had been recorded in Europe. However, a painting depicting the bird, published in the *Journal of the Swedish Sportsmen's Association*, clearly revealed it as a Parakeet Auklet (Fig. 3). Ridgway (1919: 776) also erroneously designated the Crested Auklet as "accidental" in Sweden, based on Dalgleish's list (1880). This bird had landed on Lake Vättern (58°19'N, 14°31'W), a freshwater lake near Jönköping in south Sweden, and was captured alive in December 1860. The mounted specimen is housed in the Naturhistoriska Riksmuseet (NRM 537036), Stockholm, Sweden where SGS and K. G. Kenneth Nyström examined it in 1984. The AHY bird was in basic plumage, apparently faded or foxed 124 years after collection, with no evidence of molt. The bill lacked rictal plates and was yellow rather than dark reddish orange on the mandible and culmen, typical of breeding adults (Jones *et al.* 2001; Pyle 2008).

Figure 3. Original plate illustrating the Parakeet Auklet collected on Lake Vättern, Sweden in December 1860 (reproduced from a copy of Wahlgren [1867] at Uppsala University.)

Bill height was 12.0 mm, which suggests a female (Pyle 2008: 773). Post-ocular plumes were shorter than those of breeding adults (see Pyle 2008). An adult (AHY) female (FMNH 159110) found dead on a beach near Barrow, Alaska on 3 October 1932, was in a comparable basic plumage (Table 1).

Vagrant Crested Auklets along the west coast of North America

British Columbia.—Brooks and Swarth (1925: 127) listed the Crested Auklet as hypothetical in British Columbia based on sightings of "a number of very small auklets with recurved crests" made in May 1912 by C. de B. Green, W. S. Burton and W. Pike, along the north end of Vancouver Island (also see Munro and Cowan 1947). Citing an unpublished Brooks manuscript that may have been lost in a fire that destroyed Brooks's bird collection in 1921, observations of "sea-quail" in British Columbia waters by seal hunters familiar with Crested Auklets in the Bering Sea were reported. They did not mention a specimen of Crested Auklet (RBCM 11915) collected by J. M. Lindley, a seal hunter, allegedly in winter 1892-1893, offshore from Kyuquot (50°01'N, 127°22'W), northwest Vancouver Island (Pitman *et al.* 1983; Godfrey 1986). This specimen, sexed by SGS as a female on the basis of shape and measurements of the bill, may have been among the observations made by seal hunters mentioned in Brooks's missing manuscript. R. W. Campbell "discovered" this specimen among a series of Crested Auklets collected in Alaska that was housed in the RBCM, making it the first confirmed record for British Columbia and North America, south of Alaska (Campbell *et al.* 1990; photograph p. 478). The bird was at least three years old (ASY) and in alternate plumage (see Bédard and Sealy 1984), but only three full-length feathers remained among the frontal plumes and only remnants of the bill plates were present on the nares and base of the maxilla and mandible; the ornamental rictal processes were gone. Remiges were worn and slightly faded, but not molting, typical of individuals during the chick-rearing period (Bédard and Sealy 1984); incubation patches were not discernible. The specimen was likely taken in late summer, not "winter", as the label indicated. A specimen (FMNH 159111) similar in plumage and bill characteristics was taken along the coast at Barrow, Alaska, near the northern limit of occurrence, on 17 July 1928. Other specimens (FMNH 159113, 159114, 159115) taken at Barrow between 3 and 7 October 1927, however, were molting (Table 1).

Another Crested Auklet was observed for more than one month from 5 September 2003 along the coast of southern Vancouver Island, British Columbia, about 25 km west of Victoria (48°19'N, 123°30'W) (Cecile 2004). This bird was in at least its third summer (ASY), confirmed from photographs (Cecile 2004:173; Anonymous 2004: 28; additional photographs supplied to SGS by photographer J. Jantunen). The bird's extensively worn remiges and several missing secondaries were evident, frontal plumes had molted, and the bill showed no visible plates or ornamental rictal processes.

Washington.—A dead Crested Auklet was salvaged on a road on 29 June 1937, about 160 km inland near Vance (Nickelsen 1942). The mounted, unsexed specimen was given to Nickelsen by W. Little, Game Protector in the area. Nickelsen (1942: 82) described the "wing feathers [as] completely frayed and worn, indicating long flight, [but] otherwise the bird was in good condition." Jewett *et al.* (1953) described the plumage as some-

what faded and the feathers "stringy". I. N. Gabrielson and S. G. Jewett, ornithologists familiar with this species based on visits to colonies in Alaska, confirmed the identity of the specimen in 1941, but Jewett *et al.* (1953: 675) listed Crested Auklet as hypothetical for Washington state, citing "an element of doubt as to the origin of this specimen." The late spring date and condition of the flight feathers of this bird are consistent with some other vagrant Crested Auklets recorded south of the normal non-breeding range in the Pacific Ocean.

California.—An adult male Crested Auklet (CAS 70170), weak and exhausted, was found on a beach 6 km north of Bolinas, California (37°56'N, 122°46'W) on 17 July 1979, approximately 4,200 km southeast of the nearest colony in the eastern Aleutian Islands; it was dead and salvaged the next day (Weyman 1980). Incubation patches were almost completely refeathered and feathers of the lores to rump were new, as well as some greater secondary coverts; however, rectrices and remiges were excessively worn and faded but not yet being replaced, suggesting a failed breeder (Bédard and Sealy 1984). Wear of the remiges was more extreme than normal for breeders even late in the breeding season (SGS, personal observations). The bird's mandible and maxilla showed some orange coloration, but the ornamental rictal processes were gone; there were only eight, short frontal plumes (three new ones were developing), less than the mean (26 plumes) for breeding males (Bédard and Sealy 1984). This individual weighed 163 g, almost 70 g less than the minimum recorded during the breeding season (Bédard 1969; Piatt *et al.* 1990), and considerably below weights of emaciated individuals recorded during a die-off during the egg-laying period in the northern Bering Sea in July 1966. During this die-off, two adult females (that had recently laid eggs) weighed 195 g and 247 g (Bédard 1969), and an adult male weighed 228 g (SGS, unpublished data). These weights were extremely low but body mass of Crested Auklets varies widely, within and among sites from year to year, probably reflecting fluctuations in prey availability and quality (Bédard 1969; Piatt and Springer 2003). Only one other record has been accepted for California: an ASY female photographed off Bodega Head on 24 June 1995 (Hamilton *et al.* 2007: 217).

Baja California.—The most southerly record of a Crested Auklet in the eastern Pacific Ocean and only Mexican record was an ASY adult in breeding plumage seen clearly by several observers at sea on 7 July 1980, about 15 km ESE of Cedros Island (27°59'N, 115°00'W), off central west Baja California (Luther *et al.* 1983; Pitman *et al.* 1983). Pitman *et al.*'s (1983: 47) detailed description left little doubt that the bird was an adult Crested Auklet: "The prominent bill was bright orange (or reddish yellow), . . . and had a somewhat rounded appearance when viewed from the side," which suggested a male (see Jones 1993b: 528).

Parakeet Auklet Movements in the Pacific Ocean

Parakeet Auklets occur farther south in pelagic waters of the North Pacific Ocean during the non-breeding season than Crested Auklets and in some years individuals move beyond what may be considered the Parakeet Auklet's normal non-breeding range (Gaston and Jones 1998), with some individuals reaching the Hawaiian Islands (Clapp 1986). Since the first records in California in 1895 (Grinnell and Miller 1944) and in Washington in 1898-1899 (Dawson 1908; Dawson and Bowles 1909), beachcast carcasses of Parakeet Auklets have regularly been salvaged from Washington to California during the 20th century. Recently, they have been recorded regularly in winter offshore of California and occasionally during the rest of the year (Hamilton *et al.* 2007). Occurrence along the west coast probably did not reflect vagrancy but rather were responses to variable feeding conditions that may attract individuals inshore, or result in die-offs (Beck 1910; Clapp 1986). After the earliest British Columbia records in 1892-1893 and 1912 (see above), the next confirmed record was in 1971 (Campbell and

Shepard 1973) and in 1989 15 carcasses were salvaged on southwest Vancouver Island after the *Nestucca* oil spill that may have drifted north from Washington (Rodway *et al.* 1989; Campbell *et al.* 1990). Since the late 1980s, Parakeet Auklets have been observed occasionally in British Columbia (CLO and NAS 2011) and they may have been overlooked previously in offshore waters. Most individuals apparently move considerable distances south of the colonies in the Bering Sea during winter and then apparently eastward before reaching the west coast, primarily between California and Washington and more occasionally in British Columbia. This variable pattern of distribution during the non-breeding season might be expected to promote long-distance vagrancy in the Parakeet Auklet, but this is not the case. No vagrant records are known south of California or Hawaii.

DISCUSSION

Two vagrant Crested Auklets and the single Parakeet Auklet recorded in the Atlantic Ocean between 1860 and 1972, and five vagrant Crested Auklets along the west coast of North America between 1892 and 2003, were adult males and females recorded primarily in summer through early autumn. Rare inter-ocean vagrancy in these auklet species and rare Pacific vagrancy in Crested Auklet apparently have not changed greatly over the last 150 years. Vagrancy in the two other species of *Aethia* that breed in the north Pacific Ocean, Least Auklet (*A. pusilla*) and Whiskered Auklet (*A. pygmaea*), is even rarer with about five records for both species combined from the west coast of North America and none from the Atlantic (SGS and HRC, unpubl. data). The limited post-breeding movements of auklets (*Aethia* spp.), except for the Parakeet Auklet, may contribute to the infrequent vagrancy in these species, especially during the non-breeding season; a similar pattern has been noted in Kittlitz's Murrelet (*B. brevirostris*), although the number of murrelet records south of the normal non-breeding range between southern British Columbia and California has increased slightly in recent decades (Carter *et al.* 2011).

Following the breeding season in August through October, substantial numbers of adult Crested and Parakeet auklets in breeding plumage move north of the colonies into the eastern Chukchi Sea and Beaufort Sea (Bailey *et al.* 1933; Gabrielson and Lincoln 1959; Pitelka 1974; Kessel 1989; Table 1), despite encountering relatively unproductive waters (Piatt and Springer 2003). This regular post-breeding movement finds many adult auklets at the west end of the Northwest Passage, with some recorded as far west as Wrangel Island in the late summer (Jones *et al.* 2001). If blown eastward from this region, vagrant individuals may arrive as early as late summer through late fall on the Atlantic side of the continent, generally matching the dates when the Atlantic vagrants were recorded. On the other hand, individuals may have moved eastward the previous fall and survived until the following summer when recorded in the Atlantic. Overwinter survival at sea by vagrant Kittlitz's Murrelets and other seabird species outside their normal non-breeding ranges have been documented (Carter *et al.* 2011; also see Goetz *et al.* 1986; Waldon 1994).

The direction of movements by vagrant alcids in the north Pacific Ocean and across North America has generally been from west to east, reflecting major global wind and storm patterns that likely assist many of these movements (Munyer 1965; Sealy *et al.* 1991; Mlodinow 1997). In the eastern north Pacific, there also is a tendency for a few vagrant individuals of certain alcid species to move south of their normal non-breeding ranges (Sealy and Carter 2004b; Carter *et al.* 2011). Movements west across Asia or along the north coast of Asia are less likely, although Maumary and Knaus (2000) favored this route in their explanation for the occurrence of a Long-billed Murrelet in Switzerland. Crested and Parakeet auklets recorded in the Atlantic Ocean probably travelled from the Bering Sea north through the Chukchi Sea along the north coast of Alaska through the Beaufort Sea and over islands and waterways of the Canadian Arctic Archipelago, likely aided by strong westerly winds. The short-

est straight-line distance to the southern tip of Greenland from the Chukchi Sea is about 4,900 km. A flight from the Chukchi Sea overland to the Atlantic Ocean north of Newfoundland would be 5,600 km, leaving another 1,000 km to travel to reach locations off Greenland and Iceland. Following a northern route directly across Canada and Greenland, the Parakeet Auklet would have flown some 5,800 km to Sweden.

Our hypothesized northern route for vagrant auklets from the Chukchi Sea through the Canadian Arctic archipelago to the Atlantic Ocean (also see Jourdain 1936) is supported by: (1) small numbers of Crested Auklets blown occasionally short distances into the interior of Alaska directly from the Bering Sea; and (2) only one auklet and two other Pacific alcid records east of Alaska in arctic Canada. Alaska inland records of Crested Auklets include: (1) a juvenile (HY) that struck a tower near Nulato (64°43'N, 158°06'W), about 130 km inland from Norton Bay, in September 1937 (Geist 1939); and (2) four adults <2 km inland at Hooper Bay (61°31'N, 166°05'W) during a storm in June 1952 (Humphrey and Phillips 1958). Pacific alcid records in arctic Canada include: (1) an AHY Least Auklet found dead at Kittigazuit (69°20'N, 133°41'W), on the delta of the Mackenzie River, Northwest Territories on the southeast Beaufort Sea coast, in May 1927 (Porsild 1943); (2) an HY Ancient Murrelet reported at Pelly Lake (62°04'N, 130°19'W), Yukon in November 1951 (Soper 1954), about 900 km south of the Beaufort Sea; and (3) an adult Horned Puffin (*F. corniculata*) in breeding plumage taken near Coppermine or Kugluktuk (67°49'N, 115°07'W), on the south Coronation Gulf coast (below Victoria Island), Nunavut in late August (Smith 1974).

Despite relatively few inland observers in Alaska and arctic Canada, the absence of records of Crested and Parakeet auklets along most of the proposed northern route (i.e. after moving a relatively short distance inland from Chukchi Sea or Bering Sea) suggests that land or sea were over flown. The occurrence of a Least Auklet at the Mackenzie River delta, considerably east of its normal range in the Bering Sea before extensive ice break-up, is most unusual and could reflect highly unusual weather effects or use of a nearby polynya.

Concluding Remarks

Long-distance vagrancy has been recorded so infrequently in Crested and Parakeet auklets that our explanations of factors promoting it and routes travelled from the Pacific to the Atlantic Ocean must be considered tentative. Better identification of patterns of vagrancy will result from documentation of additional records of vagrant auklets and other seabirds, collation of published and often hidden unpublished historical records, and better understanding of weather patterns. Stable isotope analysis, genetics, and satellite tracking also hold promise to assist identification of source localities or populations of some vagrants (Jouventin and Weimerskirch 1990; Fox *et al.* 2007; Pyle 2009; Birt *et al.* 2011; Landers *et al.* 2011).

ACKNOWLEDGMENTS

J. Fjeldså facilitated SGS's visit to the Zoologiske Museum, Copenhagen in 1984 and supplied photographs of Crested Auklets collected in Greenland and Iceland. K. Kampp translated notes that accompanied the Greenland specimen of the Crested Auklet, which were originally held among the papers of F. Salomonsen. He also pointed out the reference in which the Greenland record of the Crested Auklet was listed. A. Petersen translated several articles from Icelandic. K. G. K. Nyström translated articles from the Swedish literature and greatly facilitated SGS's visit to Stockholm in 1984, where C. Edelstam (Naturhistoriska Riksmuseet) permitted us to examine specimens and to photograph the Swedish specimen of the Parakeet Auklet. More recently, U. Johansson, of the same institution, provided additional details on this specimen. N. Konyukhov examined the photograph of the Crested Auklet taken in Greenland and commented on its plumage. M. Asp (National Library of Sweden) scanned the plate of the original illustration of the Parakeet Auklet taken in Sweden. Examination of specimens and loans of specimens from museums in North America to SGS were graciously facilitated by L. J. Baptista, M. Flannery and J. Schonewald (California Academy of Sciences); R. J. Cannings, N. A. Din and R. Kenner (University of British Columbia); J. W. Fitzpatrick (Field Museum of Natural History); R. W. Campbell, G. W. Hughes and M. C. E. McNall (Royal British Columbia Museum); D. D. Gibson (University of Alaska Museum); and S. Rohwer

(University of Washington Burke Museum). J. Jantunen provided additional photographs of the second record of Crested Auklet from British Columbia. R. A. Paynter, Jr. (Harvard University) and M. R. Wright (Vassar College) responded to inquiries regarding the whereabouts of the putative specimen of Crested Auklet taken in Massachusetts. This work was funded by the Natural Sciences and Engineering Research Council of Canada.

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