

EGG TEETH AND HATCHING METHODS IN SOME ALCIDS

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RECENT discussions on egg teeth (Wetherbee, 1959; Clark, 1961; Parkes and Clark, 1964) give little data on the Alcidae. While studying breeding biology of Parakeet (*Cyclorhynchus psittacula*), Crested (*Aethia cristatella*), and Least (*A. pusilla*) Auklets on St. Lawrence Island, Alaska, in 1966 and 1967, I had opportunity to observe egg teeth in several alcid species and hatching in the auklets and Horned Puffin (*Fratercula corniculata*). These observations are supplemented by examinations of alcid chicks in the American Museum of Natural History (AMNH) examined by C. E. O'Brien, Los Angeles County Museum (LACM) examined by K. E. Stager, National Museum of Canada (NMC) examined by W. E. Godfrey, San Diego Natural History Museum (SDNHM) examined by J. E. Jehl, Jr., University of British Columbia Museum of Zoology (UBCMZ), University of Michigan Museum of Zoology (UMMZ), United States National Museum (USNM) examined by R. C. Banks, and University of Washington Burke Museum (UWBM) examined by L. Spring. Specimens in UBCMZ and UMMZ were examined by myself.

ANNOTATED LIST

Alca torda.—Bédard (1969) reported the persistence of egg teeth in Razorbills up to the 14th day after hatching. Kartaschew (1960) and Perry (1940) figured egg teeth on the upper mandibles of this species. Chicks in SDNHM showed egg teeth on upper mandibles.

Uria aalge.—Tuck (1961) mentioned the presence of egg teeth in Common Murres; Perry (op. cit.) figured it in this species. One chick in NMC showed an egg tooth on the upper mandible only but some chicks of this species in SDNHM showed both upper and lower egg teeth.

Uria lomvia.—Tuck (op. cit.) mentioned the presence of egg teeth in Thick-billed Murres; Kartaschew (op. cit.) figured it in this species. Three chicks in NMC showed egg teeth on their upper mandibles only.

Plautus alle.—Bateson (1961) figured the egg tooth on the upper mandible of a Dovekie.

Cephus grylle.—Winn (1950) observed egg teeth becoming relatively smaller following hatching and disappearing between the 25th and 35th day after hatching. Kartaschew (op. cit.) figured egg teeth on the upper mandibles of Black Guillemots. Eight chicks in NMC showed egg teeth on their upper mandibles; one of these chicks has what looks like a very small remnant of an egg tooth on its lower mandible also (Godfrey, pers. comm.).

Cephus columba.—Thoresen and Booth (1958) figured the egg tooth of newly hatched Pigeon Guillemots and Drent (1961) observed it in chicks up to 28 days of age. On St. Lawrence Island, I observed two chicks which lost it between the 27th and 30th days after hatching. Two newly hatched chicks in UBCMZ show small, bilateral protuberances on their lower mandibles; these were undetectable in chicks of about two weeks of age

and older. Newly hatched Pigeon Guillemots in SDNHM also showed egg teeth on their lower mandibles.

Brachyramphus marmoratum.—Three chicks in UBCMZ and three in UWBM showed egg teeth on their upper and lower mandibles; each chick had fledged and was in juvenal plumage. Drent and Guiguet (1961) mentioned egg teeth being present on the upper mandibles of the UBCMZ specimens but did not mention egg teeth on their lower mandibles.

Brachyramphus brevirostre.—Thompson et al. (1966) figured and described the egg tooth on the upper mandible only in one chick. R. M. Mengel (pers. comm.) examined this specimen and reported an egg tooth-like structure also on its lower mandible; it takes the form of a double swelling with a slight trough separating the protuberances.

Endomychura hypoleuca.—Three chicks in AMNH and one in LACM show vestiges of egg teeth on their upper mandibles only. Chicks of this species in SDNHM show egg teeth on both mandibles and one chick in USNM which is labeled "just hatched" (Banks, pers. comm.) does not have an egg tooth on either mandible which indicates that it possibly fell off soon after hatching or during preservation.

Endomychura craveri.—Chicks in SDNHM showed egg teeth on their upper mandibles only; further observations are needed to establish the presence of egg teeth on their lower mandibles.

Synthliboramphus antiquum.—Drent and Guiguet (op. cit.) figured the egg tooth of this species. Newly hatched chicks in UBCMZ showed egg teeth on their upper and lower mandibles. Egg teeth on the upper mandibles in 11 chicks examined by me averaged 2.5 mm in diameter at their base.

Synthliboramphus wumizusume.—Three newly hatched chicks in UMMZ showed no egg teeth; however, each chick's label contains the notation "egg tooth white" (presumably referring to that on the upper mandible only). As in *E. craveri*, additional information is needed to establish the presence of egg teeth on their lower mandibles.

Ptychoramphus aleutica.—Thoresen (1964) figured the egg tooth on the upper mandible of a one-day-old chick; an 11-day-old chick showed no egg tooth. Egg teeth of nine newly hatched chicks in UBCMZ averaged 1.0 mm in basal diameter. Chicks in LACM, UBCMZ and SDNHM showed no egg teeth on their lower mandibles.

Cyclorhynchus psittacula.—The egg tooth, found only on the upper mandible, averages 1.5 mm in diameter at the base at hatching and gradually becomes smaller until it disappears between the 8th and 10th days after hatching.

Aethia cristatella.—Egg teeth of the upper mandibles average 2.4 mm in basal diameter and, like those of *C. psittacula*, become smaller and gradually disappear between the 8th and 10th days after hatching.

Aethia pusilla.—Egg teeth, on upper mandibles only, average 1.0 mm in basal diameter at hatching and persist up to about the 12th day after hatching.

Aethia pygmaea.—Two downy chicks in USNM showed egg teeth on their upper mandibles only.

Cerorhinca monocerata.—Four chicks in UWBM, two of them about one or two weeks old, do not have egg teeth. Richardson (1961) figured a four-week-old chick that did not have an egg tooth; three chicks about this age in UBCMZ also showed no egg teeth. Three chicks from piped eggs in UWBM showed egg teeth on their upper mandibles only (L. Spring, pers. comm.) which indicates that egg teeth in this species are apparently lost within a week or two after hatching.

Fratercula arctica.—Kartaschew (op. cit.), Lockley (1953), and Myrberget (1959) figured the egg tooth on the upper mandible.

Fratercula corniculata.—I observed the persistence of an egg tooth on the upper mandible of a nestling on St. Lawrence Island up to the 29th day after hatching. The basal diameter of three egg teeth at hatching averaged 3.5 mm.

Lunda cirrhata.—Drent and Guiguet (op. cit.) figured the egg tooth of the upper mandible. Chicks in SDNHM showed egg teeth on their upper mandibles.

Each alcid species examined possessed an egg tooth on the culmen near the tip of the upper mandible; the absence of egg teeth on some chicks is probably attributable to loss during handling and preservation. This egg tooth does not encompass the entire tip of the mandible as is the case in scolopacids (Jehl, 1968). In *Cerorhinca monocerata* the egg tooth appears to be deciduous like that of scolopacids and apparently is lost soon after hatching. Chicks of *Brachyramphus marmoratum*, on the other hand, retain it until their juvenal plumage is assumed and they have fledged (see Drent and Guiguet, 1961:80). Egg teeth in auklets and probably most other alcids gradually disappear without, apparently dropping off abruptly.

Egg teeth or teeth-like structures were found on the lower mandibles of *Uria aalge*, *Cepphus grylle*, *C. columba*, *Synthliboramphus antiquum*, *Endomychura hypoleuca*, *B. marmoratum*, and *B. brevirostre*. These egg teeth of lower mandibles of *Synthliboramphus* and *B. marmoratum* consist of thin, apparently calcareous, sheets that cover the entire tips of the mandibles. The egg teeth on the lower mandibles of *C. columba* and *B. brevirostre* differ in that they are in the form of a double, apparently bilateral, protuberance. The time of disappearance of this structure also varies; within a few days in *C. columba* and retained at least until the young have fledged in *B. marmoratum*.

Jehl (1968) discussed the apparent significance of the egg tooth, if it should be called such, of the lower mandible in scolopacids. He found no obvious role in hatching and stated that it may function to protect the delicate tip of the lower mandible during hatching. It is interesting to note that those alcids so far shown to possess an "egg tooth" on their lower mandibles have pointed bills with upper and lower mandibles being of nearly equal length. I have no observations on hatching in those species with egg teeth on their lower mandibles but in auklets, where egg teeth are present only on upper mandibles, the lower mandibles are not involved in hatching. It is possible that the function of the "egg tooth" on the lower mandibles of alcids with "pointed beaks" may be also of a protective nature.

The time between the occurrence of the first cracks on the shell and the emergence of the chick from the shell is variable in the auklets and Horned Puffin. This interval in four eggs of *C. psittacula* was two to four days (mean, 3.0 days), in eight eggs of *A. cristatella* was two to six days (mean, 3.3 days), in 27 eggs of *A. pusilla* was two to seven days (mean, 3.2 days), and in two eggs of *F. corniculata* was four to five days (mean, 4.5 days). In

hatching of auklets the first cracks appear at a level approximately one-third the distance from the larger to the smaller end of the egg. Pip holes then progressively develop until they reach about 0.7 cm in diameter about two days later in *C. psittacula* and *A. cristatella* and 0.5 cm in *A. pusilla* about three days after the initial cracking. With the egg tooth in contact with the shell the chick gradually cuts off the large end, pushes the resulting loose cap upwards, and emerges. The loose end is usually pulled back into "place" by a portion of adhering outer shell membrane. This sequence is similar in *F. corniculata* except that the pip hole, ultimately 0.9 cm in diameter, forms two to three days after the first cracks appear and the large end is cut off at an angle to the long axis of the egg rather than perpendicular to it as in the auklets.

These hatching methods are similar to that of *Cephus columba* (Drent, 1961) but the time involved in hatching by auklets is more variable than in *Alca torda* (Bédard, 1969), *C. columba* (Drent, op. cit.), and *Ptychoramphus aleutica* (Thoresen, 1964). In *F. arctica*, Myrberget (1962) found the average time from the appearance of the first cracks to emergence of the chick to be 4.3 days. In 37 out of 50 cases he found the "lid" of the egg inside the large section of the shell. Tuck (1961:155) stated that two or more days may be required for murre chicks (*Uria* spp.) to hatch, and occasionally "the adult assists by pecking away all or part of the hard, calcareous shell." Adult auklets were not observed in the present study helping chicks out of the eggs.

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