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Ageing and moult in western palaearctic Hawk Owls *Surnia u. ulula* L.

DICK FORSMAN

During the autumn of 1976 a remarkable invasion of Hawk Owls was noted along the southern coast of Finland (cf. Hildén 1977). The first birds were observed about mid-September, and the invasion peaked during October. Due to abundant food supplies, mainly *Microtus* voles, many birds wintered in the area. The last observation was made on 20 March 1977.

In all, 52 Hawk Owls were caught in a modified clap-bow net, using live bait consisting of different species of voles and lemmings. All the birds were studied with respect to plumage and moult, and records were made of wing length, tail length, bill length and weight. The sex of the birds could not be determined, however. In addition, data on moult and plumage were obtained from 151 skins examined at the Zoological Museum of the University of Helsinki.

All the birds caught during the invasion were found to be juveniles, whereas the skin material represented both juveniles and adults.

Two main ageing characteristics were found, which proved to be reliable in all the birds studied, especially when used together. First, the two outermost pairs of rectrices were found to differ in shape, and in most cases also in colouring, between first-year and older birds (Fig. 1). Second, the innermost secondaries, the so-called tertials, differed between the two age groups in shape and colour pattern, and also in the degree of abrasion (Fig. 2). However, the difference in abrasion is lost during winter because of wear, and cannot be used for ageing spring birds.

As in other owls, the juveniles of the Hawk Owl moult their entire feathering, except for the remiges, rectrices and primary coverts, after leaving the nest (e.g. Glutz et al. 1980). Of the 52 juveniles trapped, only one bird, from 27 October, was in active body moult, all the others being in definite first-year plumage. This bird was still growing the greater coverts of its first-year plumage, having both old mesoptile and recently grown or growing greater coverts in both wings. The rest of the body was already covered with first-year plumage feathers.

The museum material consisted of 19 adult and 132 juvenile Hawk Owls. Of the adult birds, 14 were from autumn, the remaining five being collected between 27 April and 1 June. Only four of the birds were from the species' normal breeding grounds, in the northern part of the country, the others came from different parts of central and southern Finland, which indicates that they were collected during irruption.

None of the adult birds were found to be in active moult. All had moulted completely their primaries and rectrices, but only two specimens had renewed all their secondaries. In all but these two birds the moult of the secondaries was interrupted, both fresh and very worn feathers occurring in the same wing. Most birds had secondaries nos. 3 and 4 (counted ascendantly, towards the body), and secondaries 6, 7 and 8 unmoulted, whereas secondaries 1, 5 and 10—15 were moulted in almost every bird. In about half the birds secondaries 2 and 9 were also moulted. The stage of the moult varied widely between birds — from 10 to 3 unmoulted secondaries.

Most of the adult birds proved to be in their second year. These birds could be aged from differences in the shape of the unmoulted juvenile and the adult secondaries. The worn juvenile feathers were longer and more pointed than the recently grown adult-type feathers. Thus the difference in feather shape was similar to that found in the rectrices and tertials. A similar difference between adult and juvenile types of feathers has earlier been shown for several kinds of birds (Svensson 1975, Forsman 1980).

Analysis of the arrested moult of secondaries suggests that the Hawk Owl moults its secondary remiges in the manner reported for different species of accipitrid raptors (Edelstam 1969, Forsman 1980). The secondaries are moulted from four different foci, apparently starting with the tertials and the following innermost feathers. When these foci have been activated new moult "waves" start from secondaries nos. 1 and 5 and travel towards the body. This explains why secondaries 3—4 and 6—8 are so

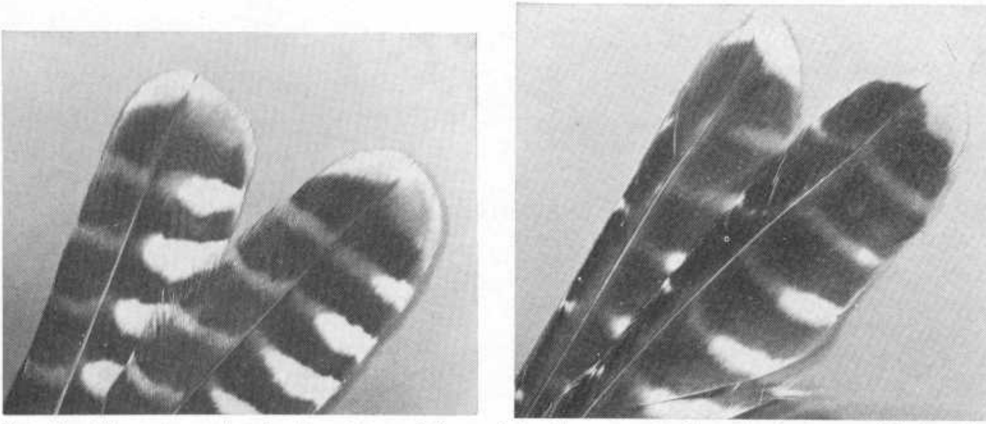

FIG. 1. The outermost pair of rectrices of *S. u. ulula*. Compare the broader feathers, with broadly rounded tips, of the adult (left) with the more narrowly pointed feathers of the juvenile (right). Note also the pale subterminal bar on the inner web, which is partly white in adults, but greyish brown in juveniles.

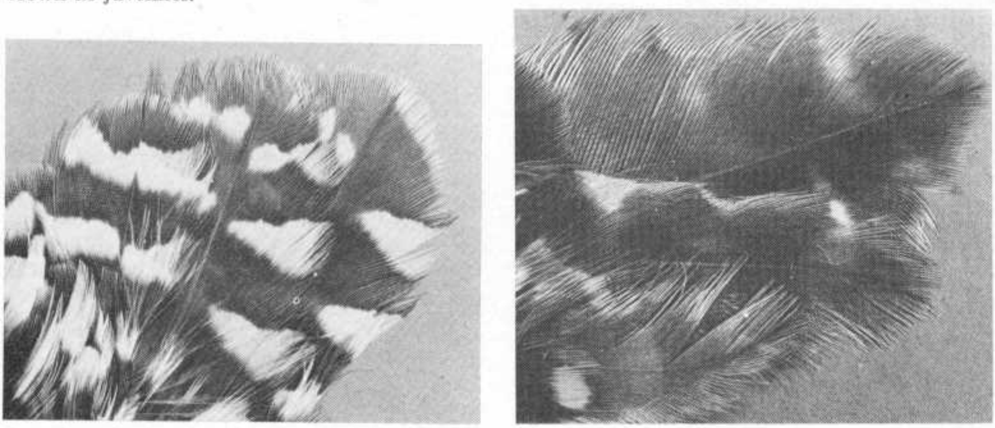

FIG. 2. The tertials of *S. u. ulula*. Note the rounded shape and striking pattern in the adult, with the white markings often forming bars across the feather (left). The juvenile tertials are more pointed, dull brown and abraded and often with the marginal spots hardly visible due to wear (right). Both birds depicted above are collected in November.

often found unmoulted in wings with arrested secondary moult.

The arrested secondary moult found in this highly irruptive species may be explained by fluctuations in the birds' staple food. When voles and lemmings are scarce, the birds are forced to leave their breeding grounds to search for places where food is more abundant. This scarcity of food, prevailing during years with large-scale irruptions, may cause abnormalities in the moult, as a result of unsatisfied energy demands. This may be the reason why so many Hawk Owls participating in invasions are found with arrested wing moult.

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Selostus: **Hiiripöllön iänmäärityksestä ja sulkasadosta**

Syksyn 1976 hiiripöllövaelluksen aikana läntisellä Uudellamaalla pyydystettiin 52 nuorta hiiripöllöä puku-, sulkimis- ja biometrisiä tutkimuksia varten. Lisäksi tutkittiin Helsingin yliopiston Eläinmuseossa 151 hiiripöllön nahkaa.

Hiiripöllöt voidaan määrittää iälleen pyrstösulkien sekä sisimpien kyynärsulkien, ns. tertiaalien, muodon, värin ja kuvioinnin perusteella. Nuorilla, edellisen kesän poikasilla (kuvassa 1 oikealla) pyrstösulat ovat kapeat ja teräväkärkiset ja sisähöydyn uloin vaalea poikkijuova on harmahtavan ruskea. Vanhan linnun (kuvassa 1 vasemmalla) pyrstösulat ovat leveämmät, kärki on pyöreämpi ja sisähöydyn uloin vaalea juova on osaksi valkoinen. Tertiaalit (kuva 2) ovat vanhalla linnulla (vasemmalla) pyöreäkärkiset ja kirkaskuvioiset sekä syksyllä tuoreet; nuorella (oikealla) ne ovat kapeahkot, himmeänruskeat ja useimmiten vain reunoiltaan kuvioidut sekä jo syksyllä kuluneet.

Lähes kaikilla vanhoilla hiiripöllöillä todettiin keskeytynyt kyynärsulkien vaihtuminen. Vaihtuneiden ja vaihtumattomien kyynärsulkien muotoerojen perusteella monet linnuista osoittautuivat toisella elinvuodellaan oleviksi. Kuluneet juv-sulat ovat pitempiä, kapeampia ja terävämpikärkisiä kuin tuoreet jo vaihtuneet ad-sulat. Keskeytynyt sulkasato heijastanee pesimäalueiden huonoa ravintotilannetta, sillä myyräkatovuosina voidaan olettaa linnuilla olevan energiataloudellisia vaikeuksia sulkia loppuun. Kun vielä vaelluksetkin sattuvat juuri näille vuosille, on odotettua että monella vaeltavalla hiiripöllöllä on siipisulkasato keskeytynyt.

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A Great Tit *Parus major* roosting in snow

PEKKA HELLE

Gallinaceous birds (Tetraonidae) commonly roost in the snow in winter, particularly in northern regions, whereas this behaviour is quite rare among small passerines, e.g. *Acanthis flammea, A. hornemanni, Pyrrhula pyrrhula* and *Plectrophenax nivalis* (e.g. Sulkava 1969). Tits *Parus* spp. seldom roost in snow, and when they do, they are reported to use only ready-made cavities and even nests of small rodents (Haftorn 1972, Novikov 1972).

On 16 January 1972, a Great Tit was observed digging down into the snow in early twilight at 4 p.m. in the town of Jyväskylä, central Finland (62°15'N, 25°45'E). The observation was made during a cold period, the temperature being —16°C. On the following day it was confirmed that the Tit really had roosted in the snow, as excreta were found at the bottom of the burrow. The hole was situated in a steep snow bank (ca. 45°) made by a snow-plough, where the uppermost snow layer of about 15 cm was very soft. The bank was in an open treeless area. The distance between the entry and exit openings was 40 cm and the diameter of the passage averaged ca. 50 mm. There was 10 cm of snow above and 40 cm of snow below the roosting place, which was only a little larger than the passage itself.

Usually, the Great Tit roosts in holes in trees and buildings and in nest-boxes. It tries to find warm, sheltered places for roosting, such as the ventilator shafts of buildings or street lamps, and this may be one factor enabling it to overwinter far north in Lapland (Hildén 1977). Thus roosting in snow can be added to its possible adaptation mechanisms. A cover of snow is known to be effective in reducing heat loss (e.g. Koskimies 1958, Volkov 1968), which is one of the most serious problems for small passerines wintering in northern regions.

Selostus: **Talitiaisen yöpyminen lumikiepissä**

Talitiaisen nähtiin kaivautuvan lumikieppiin iltapäivän hämärässä 16.1.1972 Jyväskylässä.