

REFERENCES

- Cramp, S. and Simmons, K.E.L. 1983. *The Birds of the Western Palearctic*, Vol. 3. Oxford University Press, Oxford.
- Hallam, T.J. (ed.) 1980. Wildlife in Bahrain. *Bahrain Natural History Society, Annual Reports for 1978 - 1979*.
- Hill, M. and Nightingale, T. (eds.) 1984. Wildlife in Bahrain. *Third Biennial Report of the Bahrain Natural History Society*.
- Jennings, M.C. 1981. *Birds of the Arabian Gulf*. George Allen and Unwin Ltd. London.
- Pomeroy, C.A. (ed.) 1980. Royal Air Force Ornithological Society Masirah Island Expedition (1979). Unpublished report.
- Royal Air Force Ornithological Society. 1978. The Royal Air Force Ornithological Society's Expedition to Masirah Island 6th to 26th October 1976. Unpublished report.
- Smart, I., Miles, G.A. and West, M. 1983. Waders and water birds on Dubai Creek. *Wader Study Group Bull.* 37: 29-30.
- Wilson, J.R., Czajkowski, M.A. and Pienkowski, M.W. 1980. The migration through Europe and wintering in Africa of Curlew Sandpipers. *Wildfowl*. 31: 107-22.
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FURTHER OBSERVATIONS ON THE WING PLUMAGE OF DUNLINS

by Jadwiga Gromadzka

This note is a further contribution to the discussion about Dunlins *Calidris a. alpina* with "adult buff" coverts (Gromadzka and Przystupa 1984, Clark 1984) and about the value of brownish-buff fringed feathers (the remains of juvenile plumage) in the inner median coverts as the feature differentiating 2nd-year from older Dunlins (Prater *et al.* 1977).

As was shown earlier (Gromadzka and Przystupa 1984), adult Dunlins with new "adult buff" median coverts have been appearing at Gdansk Bay (Poland). It was noticed that these birds, as with 2nd-year birds, moult their primaries earlier than individuals older than their second year (Gromadzka in press). Clark (1984), who proposed the term "adult buff" coverts, suggested that these may be 2nd-year birds.

Observations on wing moult and the appearance of the median coverts before and after moult were made in 1984 during Dunlin ringing operations in two places at Gdansk Bay: Vistula mouth and Reda mouth (c. 45 km NW of Vistula mouth). 1209 adult Dunlins, trapped in August and September, were examined for the moult-plumage analysis; all were aged as either 2nd-year or after 2nd-year, according to Prater *et al.* (1977) (i.e. 2nd-year - birds with brownish-buff fringed feathers in the inner medians; after 2nd-year - without brownish-buff feathers in the inner medians).

Amongst those birds analysed, 17% were individuals with new "adult buff" coverts; most of these were in the group of 2nd-year Dunlins, but 8% of the birds with "adult buff" medians did not have any brownish-buff colour in the inner medians (Table 1). 15% of the Dunlins examined had new inner medians with brownish-buff fringes, implying that these birds, if caught next spring or early summer, would be aged as 2nd-year, although their real age would be 3rd year, at least. Distinguishing old and new feathers in the inner medians may seem to be difficult for inexperienced persons, but after handling many birds it is easy to see the difference in colour intensity (old feathers are more pale). Thus, a proportion of birds which are aged as 2nd-year are, *de facto*, older. The same discovery was earlier made by J. Vuorinen (Vuorinen *et al.* 1979, in litt.) amongst Dunlins ringed at Ottenby (Sweden, August 1977) where 13% had new inner medians

Table 1. Numbers of Dunlins examined for moult-plumage analysis at Gdansk Bay between 4 August and 30 September 1984.

age ¹	all birds	birds with "adult buff" coverts
2nd-year ²	479	192
>2nd-year	730	17
total	1209	209

¹ age estimated according to Prater *et al.* (1977);

² included here are also 185 (15%) birds with new inner medians with brownish-buff fringes.

with brownish-buff fringes. He found that a shape difference exists between 2nd-year (=juvenile) inner medians and those of older birds. This feature needs checking on a larger sample.

There are also recaptures of ringed Dunlins indicating that the colour of the medians is not necessarily connected with their age. For example, a Dunlin ringed as a juvenile during the autumn in Germany (Schleswig-Holstein) was controlled after two years as a 2nd-year bird at the Vistula mouth. Another Dunlin ringed as a juvenile in Great Britain was controlled at the Vistula mouth after eight years and had new "adult buff" coverts. Two Dunlins ringed as 2nd-year birds at the Reda mouth in 1983 were controlled there next year, again as 2nd-year birds. Another Dunlin ringed at the Vistula mouth in 1983 with "adult buff" coverts again had new "adult buff" coverts when controlled at the same place in the following year.

The brownish-buff colour in the new medians of Dunlins has appeared in birds with much advanced moult, i.e. in those individuals which had started the moult early (Gromadzka in press). Several categories of Dunlins may start the moult early:

- 1) birds which usually do not breed; in most cases these are 2nd-year Dunlins (Kozlova 1962);
- 2) birds which would usually breed, but which have not bred this year e.g. because of poor body condition, the lack of mate, etc.;
- 3) birds which lost their broods early in incubation;
- 4) birds which begin moult during breeding.

The last kind of moult strategy is characteristic of the far east populations, which do not migrate to Europe (Kozlova 1962, Greenwood 1983, P. Tomkovich in litt.). It is known that Dunlins from the Tchukotka peninsula (USSR, between c. 170°W and 180°W) begin moult during breeding before leaving for their winter quarters, and that they have new "adult buff" median coverts (P. Tomkovich in litt.). Tomkovich's opinion, as well as L. Goede's (in litt.) and J. Vuorinen's (in litt.), is that hormone level is responsible for the coloration of medians.

Three moult strategies of *alpina* Dunlins migrating in autumn through Europe, are known:

- 1) initiation of moult after breeding and its continuation during migration;
- 2) initiation of moult after breeding, arresting it, migrating and finishing the moult in the winter quarters (Kozlova 1962, Lilja 1969, Glutz et al. 1975);
- 3) migrating from breeding grounds to some moulting places in western Europe, such as Waddensee (Boere 1977) or the Wash (Johnson and Minton 1980), before initiating moult, and after moulting there, moving on to wintering grounds.

There has been no direct evidence that Dunlins which start their moult on their breeding grounds migrate through Europe, but it probably does occur. According to Greenwood's (1983) analysis, the Dunlins which moult on their breeding grounds breed to the east of the Ural mountains (ca 60°E). In fact the eastern border of the breeding range of Dunlins which occur in autumn in Europe is not known. It may be between the Ob and Yenisey rivers. Dunlins from the area east of the Urals migrate to Europe, e.g. from the Yamal peninsula (Cramp and Simmons 1983, Gromadzka 1985), where males were found attending young and moulting their primaries (Danilov et al. 1984, V. Ryabitsev in litt.). On the other hand many Dunlins from Yamal do not start to moult while breeding (V. Ryabitsev in litt.).

CONCLUSIONS

Some Dunlins which are more than 2 years old have inner median coverts with brownish-buff fringes. Thus some 2nd-year birds (more than 10% in the Baltic region) may be aged incorrectly.

The colour of new median coverts of Dunlins is not related directly to their age, but rather to when they start the autumn moult. Birds starting their moult earliest have brownish-buff colour in their medians. It is not known whether the initiation of moult by an individual depends on general moult strategy of the population it belongs to, or on its breeding status.

Although there are still many unsolved aspects of Dunlin migrations, it is not known why Dunlins with "adult buff" coverts are very rare in western Europe when compared with Gdansk Bay (Gromadzka and Przystupa 1984, Clark 1984). Only one explanation seems possible: Dunlins from the Baltic region migrate through regions other than those, such as Waddensee or British estuaries, which are occupied by many wader ringers.

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REFERENCES

- Boere, G.C. 1977. The significance of the Dutch Waddensee in the annual life cycle of Arctic, Subarctic and Boreal Waders. Part 1. The function as a moulting area. *Ardea* 64: 210-291.
- Clark, N.A. 1984. Ageing criteria for Dunlin. *Wader Study Group Bull.* 42: 39.
- Cramp, S. & Simmons, K.E.L. (eds.). 1983. *The Birds of the Western Palearctic*. Vol. 3. Oxford.
- Danilov, N.N., Ryzhanovskiy, V.N. & Ryabitsev, V.K. 1984. [*Birds of Yamal*.] Moscow. In Russian.
- Glutz von Blotzheim, U.N., Bauer, K.M. & Bezzel, E. 1975. *Handbuch der Vogel Mitteleuropas*. Band 6. Charadriiformes (Teil 1). Wiesbaden.
- Greenwood, J.G. 1983. Post-nuptial primary moult in Dunlin *Calidris alpina*. *Ibis* 125: 223-228.
- Gromadzka, J. 1985. [Dunlin *Calidris alpina*, In Ilyichev, V.V. (ed.). *Migrations of Birds of Eastern Europe and Northern Asia*. Vol. 4. Gruiformes - Charadriiformes.] Pp. 193-220. Moscow. In Russian.
- Gromadzka, J. in press. Primary moult during autumn migration of adult Dunlins *Calidris alpina* of different age. *Var Fagel*.
- Gromadzka, J. & Przystupa, B. 1984. Problems with the ageing of Dunlins in autumn. *Wader Study Group Bull.* 41: 19-20.
- Johnson, C. & Minton, C.D.T. 1980. The primary moult of the Dunlin *Calidris alpina* at the Wash. *Ornis Scand.* 11: 190-195.
- Kozlova, E.V. 1962. *Fauna SSSR*. Ptitsy. Tom II, v. 1. tch. 3. Moskva, Leningrad.
- Lilja, I. 1969. On the postnuptial wing moult of migratory Dunlin *Calidris alpina*. *Ann. Rep. Orn. Pori*: 40-43.
- Prater, A.J., Marchant, J.H. & Vuorinen, J. 1977. *Guide to the Identification and Ageing of Holarctic Waders*. BTO, Tring.
- Vuorinen, J., Prater, A.J. & Marchant, J.H. 1979. *Kahlaajaopas*. Lintutieto Oy. Helsinki.

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