

Evidence of prenuptial moult in the Little Bittern *Ixobrychus minutus*

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Evidence for a partial prenuptial moult in the Little Bittern *Ixobrychus minutus* is reported for the first time, and is based on both live and museum specimens. The prenuptial moult, which is probably undertaken in the African winter quarters shortly before the spring migration, involves body feathers and often some innermost secondaries. The moult pattern is discussed in the context of the Ardeidae and compared with those of other *Ixobrychus* species. Current ageing criteria are also reconsidered.

The moult of the Little Bittern *Ixobrychus minutus* is poorly known (Baker 1993, Cramp & Simmons 1977), because of a lack of information during autumn and winter, when the birds are in their African wintering grounds. What is known with certainty is that the adults undertake a complete post-breeding moult (Bauer & Glutz von Boltzheim 1966, Baker 1993, Cramp & Simmons 1977) and that some birds start the moult of body and some flight feathers in late July when still in Europe. Eventually they interrupt moult during migration and resume it in Africa, where the replacement of the feathers is completed. However, most birds do not start moulting until their arrival in the winter quarters. Furthermore, information on juveniles is scattered, and mainly based on birds held in captivity (von Lukanus 1914). A resident South African subspecies, *Ixobrychus minutus payesii*, moults the innermost 1-7 primaries descendantly, while outer primaries and secondaries are replaced in an irregular manner (Stresemann & Stresemann 1966). On the basis of these observations, it has been assumed that *I. m. minutus* moult in the same way (Cramp & Simmons 1977). Juveniles undertake a partial moult, which starts from November to January (Bauer & Glutz von Boltzheim 1966, Baker 1993, Cramp & Simmons 1977) and involves body feathers and some inner secondaries (von Lukanus 1914, Bezzel 1985).

Because of the lack of an accurate description of the moult patterns, ageing criteria have not yet been assessed clearly. According to Baker (1993) a minority of first-year birds can be aged because of the presence of a few retained outer great coverts.

During a study of the ecology of the Little Bittern in Italy, we observed that a very high proportion of breeding birds had some fresh and glossy secondaries. These feathers might have resulted from a partial pre-nuptial moult which has not previously been described for the Little Bittern. However, it is a likely pattern, especially when considered in light of the moulting patterns of other members of the family Ardeidae, and, in particular, of the American counterpart of the Little Bittern, the Least Bittern *Ixobrychus exilis* (Palmer 1962, Gibbs *et al* 1992).

METHODS

The plumage of both live birds and museum specimens was examined. Live birds were mist-netted at Montepulciano Lake, Italy (43° 06'N 11° 55'E), during 1997-2000, while the skins belonged to the collection of the Natural History Museum, Tring, United Kingdom.

Ringed birds were carefully checked for contrasts between feathers, in colour, gloss and abrasion. A moult score was assigned to each primary and secondary remex following the methods suggested by Ginn & Melville (1983): a score from zero to five, where zero is an old, unmoulted feather and five is a fully grown new feather.

With respect to the museum material, only skins in good condition and with accurate collection data were examined, with the aim of checking the plumage of adult birds during breeding or on northward migration. Even though most specimens were very old, the contrast between feather generations was still clearly visible in the majority.

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for identifying first year birds but the extremely high proportion of birds showing the presence of new flight feathers makes this unlikely. In fact the occurrence of first year birds in West Africa in summer (Morel & Roux (1966) suggests that at least some juveniles remain in the African winter quarters during their second summer, probably because they are still sexually immature. A delayed return to the breeding grounds is also known for other species of trans-Saharan migratory herons, such as the Night Heron *Nycticorax nycticorax* (Morel & Roux 1966).

Consequently it is reasonable to suggest that adults might also perform a partial pre-breeding moult, just before their departure for the breeding grounds. Partial pre-breeding moult occurs in many bird species, and especially in those with distinct breeding and non-breeding plumages (Ginn & Melville 1983). The extent of the pre-breeding moult is usually restricted to some head and/or body plumage, but it can also involve tertials, some inner secondaries and rectrices (Ginn & Melville 1983), as happens in many passerines, such as in the family Motacillidae (Svensson 1992).

Hérons are well known for their pre-breeding moult involving ornamental filoplumes, which play an important role during the courtship displays. In the Squacco Heron *Ardeola ralloides* the pre-breeding moult also involves some innermost secondaries (del Hoyo *et al* 1992).

In the Least Bittern, the only species of the genus *Ixobrychus* for which moult patterns are known, there is a post-juvenile moult in autumn and a partial first pre-breeding moult in late winter to early spring, while adults undertake a complete post-breeding (July-August) and a partial pre-breeding moult (Palmer 1962, Gibbs *et al* 1992). The partial pre-breeding moult involves body feathers, with the new feathers much glossier than older ones (Weller 1961).

It is reasonable to expect a similar moult pattern between the Least and the Little Bittern, because, according to some authors, the two species should be included in a single superspecies together with the Yellow Bittern *Ixobrychus sinensis* (del Hoyo *et al* 1992). The renewal of some inner secondaries during the partial prenuptial moult has not previously been described for the Least Bittern (Palmer 1962, Gibbs *et al* 1992), but inclusions of the inner secondaries in the pre-breeding (prenuptial) moult is not surprising. As the new feathers are glossier than the old ones, it is likely that, as in other herons, the function of the prenuptial moult in the Little Bittern might be the renewal of those parts of the plumage that play a role

in courtship and mate selection, rather than having an effect on flight performance.

Taking into account these observations, ageing criteria in spring should only rely on the remains of the juvenile plumage, such as retained scapulars and/or wing coverts (great, primary or lesser). The presence of two generations of flight feathers would not be sufficient to age a bird as a first year.

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