

## On the Function of 'Clustering' in Wood-Swallows

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From the descriptive data assembled by Hindwood (1956) on the clustering of the Dusky Wood-Swallow (*Artamus cyanopterus*) there emerges a point worthy of future investigation, i.e. the occurrence of the habit during relatively-warm weather.

Clustering is a thermo-regulatory device. The fact that it occurs "mainly in the non-breeding season" is related to the generally lower air temperatures of that period and not, as far as is known, to any phase of sexual periodicity. Heat generated by muscle activity is conserved principally by the relatively non-conducting plumage which, in times of reduced air temperature, can be erected by means of a mechanism essentially similar to that which achieves pilo-erection in mammals. Hence birds, like cats, can 'fluff themselves up' during cold weather and so avoid heat loss. The string-vest worn beneath the clothing by Arctic explorers subserves a similar function.

A few groups of birds, notably swallows (*Hirundo*), bee-eaters (*Merops*) and wood-swallows have evolved the secondary mechanism of intermittent clustering or 'swarming' by night, and sometimes during the day, until the probable advent of higher temperatures. The temporary communal establishment of a larger mass, and a relatively-small surface, delays the outflow of heat that is vital to any small animal (Marshall, 1951, 1957). In recent unusually severe and 'early' European winters, clustering Swallows have been sent south over the Alps by aeroplane in artificial migration in order to save their lives.

The phylogenetic distribution of the habit, and the probability that it has arisen independently (like so many socio-physiological mechanisms) in different aerial-feeding groups, is of great interest. A second challenging consideration is its seasonal incidence in Australian wood-swallows which inhabit areas that are, in general, not notably cold.

Thus the Dusky Wood-Swallow sometimes clusters in November, February (weather 'warm and sultry'), March ('mild though windy') (see Hindwood), and, as would be expected, in July (Chisholm, 1929). A survey of previously-recorded occurrences, and precise temperature readings in relation to future observations, might produce information of considerable value. It is difficult to imagine what advantage adult birds would get from clustering together on a warm and sultry February evening. On the other hand, re-

cently-flown young might cluster in response to a temperature reduction not appreciated in casual observation by man. Very young nestlings are practically poikilothermous ('cold-blooded') (Baldwin and Kendeigh, 1932). When the parent leaves the nest they avoid heat loss by clustering together. With the development of plumage, homoiothermy is established. It is not unlikely that juvenility (and possibly the degree of sub-cutaneous fat deposition) may be primarily responsible for the operation of the clustering mechanism in months of high temperature.

#### CONCLUSIONS

1. Clustering in wood-swallows and other birds is a thermo-regulatory device. By collectively reducing their exposed surface and increasing mass the clustering birds conserve heat.

2. The habit is commonest during the non-breeding season because this spans the colder months of the year.

3. It is not known why *Artamus cyanopterus* reputedly clusters in relatively mild weather. Precise observations, including air-temperature records, degree of maturation and sub-cutaneous fat deposition, are required.

#### REFERENCES

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**High-flying Harrier.**—Mr. C. D. Blomfield, a pilot with James Aviation Ltd., of Rotorua, New Zealand, relates the following experience. On Sunday, September 23, 1956, when flying over Atiamuri, 25 miles south-west of Rotorua, he encountered a Harrier (*Circus approximans*) flying on a parallel course. A glance at the altimeter showed 4,000 feet. Atiamuri is approximately 1,000 feet above sea-level, which gives the altitude above earth as 3,000 feet. On turning the plane in the direction of the bird to obtain a closer view, it immediately volplaned on a zig-zag course earthwards. It would be interesting to learn if any members of the Australian Falconidae have been recorded by aviators at heights of 3,000 feet or more above terra firma.—MAXWELL S. BLACK, Rotorua, N.Z., 25/9/56.