The Editor,
Sir,

DUCKS' TAKE-OFF

I was interested in Dr Fraser's letter on the direction of ducks' take-off (*Notornis* 23 (1): 75; 1976) although I cannot altogether agree with his explanation of this behaviour in terms of Coriolis Force. The Coriolis Force on a duck is extremely small (and undetectable by the duck unless it is unusually sensitive) and secondly, since this force only acts on bodies in motion, the duck would not be aware of such a force until it began to move, by which time the decision on which direction to travel has already been made. By way of a numerical example: suppose a duck weighing 1 kilogram accelerates from rest to 36 km/hr (10 m/sec) in 10 seconds. This requires a force of 1 newton. In fact a considerably larger force would be required since no account has been taken of the work done against water or air resistance, or the work done against gravity in gaining altitude. Taking air drag for example: the drag on a sphere of 30 cm diameter travelling at 10 m/sec is of the order of 2 newtons. By comparison the Coriolis Force (at latitude 45°S) acting on the duck increases from zero (when its velocity is zero) to .001 newton at 10 m/sec which is some thousands of times smaller than the other forces mentioned above.

B. R. STANTON

C/o N.Z. Oceanographic Institute,
DSIR,
P.O. Box 12-346,
Wellington North
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[Another reader comments that no doubt Dr Fraser's observations would explain why ducks ought to take off vertically on the Equator (or perhaps this is the behaviour of another well-known bird ?) — Ed.]

The Editor,
Sir,

PETRELS AND LIGHT AT NIGHT

In the course of his interesting speculations about why petrels are inconspicuous when the moon is shining but are attracted by other lights (*Notornis* 22: 302-306, 1975) Mr Imber omits to mention some other considerations. For example, in some other parts of the world landbird migrants come to bright lights much more freely than petrels, to such an extent that the British Association for the Advancement of Science mounted a great enquiry into the phenomenon in the 1880s. It was found that they also are inconspicuous on moonlit nights and in fact are most numerous when the local visibility is poor, and the few petrels that come to our coastal lights behave in the same way. A number of people whom I have interrogated about what happens when petrels come to ships' lights off subantarctic islands have confirmed that the local visibility was poor there as well.

The simplest explanation seems to be that birds which become lost in mist make for the nearest light in the hope of finding their way out of it. It is of course possible that like some invertebrates they have a simple nervous reflex which causes them to beat their wings harder on the side away from a light so that they fly towards it. The occurrence of more petrels over their breeding colonies on dark nights could also be explained by simple difficulty in finding their holes then, so that they have to make more circuits over known landmarks and call to each other to find their holes. Naturally young birds with little experience will take longer to find the place they are looking for, so that they will tend to be most conspicuous among the lost birds, while fledging chicks will tend to fly towards any light they see. It hardly seems necessary to refer to the bioluminescence of marine animals to explain the behaviour of birds circling over breeding colonies.

It is also arguable that the birds may prefer to feed on moonlit, not dark, nights, because they can see prey which comes to the surface more easily then, so that they come to land to display mainly on the darker nights when they cannot see to feed. In much the same way it has been argued that diurnal Northern Fulmars *(Fulmarus glacialis)* like to feed in rough weather and only come to shore to display when the weather is fine. Personally I suspect that they come to shore to display when the weather is fine because they can feed quickly then and have spare time, but as in the case of Mr Imber's arguments there appears to be little solid evidence available at all.

W. R. P. BOURNE

3 Contlaw Place,
Milltimber,
Aberdeen, Scotland
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