The significance of dropping behaviour in Pacific Gulls

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The Pacific Gull *Larus pacificus* is a large white-headed gull indigenous to Australia. The genus *Larus* is a large one and now includes all gulls of the sub-genera *Larus, Xema* and *Pagophila* (Moynihan, 1959). The sub-genus *Larus* consists of the larger white-headed gulls, including amongst others, the Dolphin Gull *L. scoresbii,* Herring Gull *L. argentatus,* Lesser Black-backed Gull *L. fuscus,* Greater Black-backed Gull *L. marinus* and the Kelp or Dominican Gull *L. dominicanus.* The phylogenetic and taxonomic relationships between members of *Larus* are not certain and classification has been based heavily on ethological characteristics in addition to the more usual morphological characteristics (Moynihan, 1959; Tinbergen, 1959). Of the members of *Larus,* the best known is, unquestionably, *L. argentatus* (Tinbergen, 1953, and many others) and probably the least known is *L. pacificus.*

L. pacificus is a sedentary species of south-eastern and south-western Australia and is a fairly common bird around inlets and bays in Victoria. Moynihan (1959) has suggested that the closest relatives of *L. pacificus,* based on morphological characteristics, are *L. belcheri* and *L. crassirostris* but this is by no means certain. The exact phylogenetic relationship between *L. pacificus* and other larids is not known, mainly because the ethological characteristics of *L. pacificus* remain virtually undescribed.

A full examination of the taxonomic status of *L. pacificus* is not possible at the present but I believe that is it possible to reflect on the possible significance of dropping behaviour, in terms of phylogeny, in *L. pacificus.*

There are many isolated reports in the literature of *L. pacificus* deliberately dropping objects and using sophisticated flying behaviour (see for example, Serventy & White 1943; Wheeler 1943, 1946; Chisholm 1954; Tarr 1961). Most authors contend that the birds were dropping shellfish of various species (particularly *Turbo* sp.) in order to break them open for food. Only Wheeler (1946) actually verified that shellfish were broken open and eaten: all the other evidence is anecdotal or presumptive.

My own observations of Pacific Gulls dropping objects are summarised as follows:

a. Pacific Gulls will sometimes drop objects. The behaviour is present but by no means common.
b. The flying behaviour utilized in dropping is sophisticated and relies on a high degree of aerodynamic skill. The bird picks up the object in its bill and takes off into the wind in a steep climb.

Flapping ceases at a height of about 30 feet in high wind conditions and about 10 feet in light conditions. The bird soars upwards and backwards until it is over the point from which it took off and then drops the object. The height of the drop depends on the wind speed and varies from 15 feet in light conditions, up to 60-70 feet in high wind conditions. The bird then abruptly decreases its aerodynamic angle of attack, descends almost vertically and lands just behind the fallen object. The procedure is then repeated and the number of repetitions varies from two to perhaps eight.

c. Dropping is more prevalent amongst immature birds than adults.
d. Dropping seems to occur only when there is at least a moderate wind blowing.
e. The birds drop the objects indiscriminantly into the sea, onto sand, or onto concrete. Objects falling into the sea are not usually recovered.
f. I have never been able to verify that the objects were shellfish.

At first sight dropping behaviour appears to be an example of an animal behaving with insight and foresight (knowing that a shellfish will provide food and that the best way to obtain that food is breaking the shell by dropping it). Tinbergen (1953) has shown, however, that the Herring Gull, which also drops shellfish, reacts instinctively not with insight, but to the hardness of the object which may not in fact be a shellfish. He quotes an example of a Herring Gull that pecked at an imitation wooden egg from which it received a considerable shock whereupon it immediately picked up the egg in its bill, flew upwards and dropped it. Other examples of gulls reacting in this manner to hard objects are quoted by Tinbergen, including a group of Black-headed Gulls *L. ridibundus* dropping bolts and nuts through a factory skylight in West London.

If the Herring and Pacific Gulls were behaving with insight sufficient to know that the dropping of the shellfish would break them open, it seems unlikely that they would drop the shellfish on to sand or in the sea, but rather on to a hard surface that would indeed break them. The British Carrion Crow does this deliberately (J. M. Cullen, personal communication). It appears that the gulls have learnt to drop shellfish but have not learnt to drop them on to a hard surface. This is further supported by the fact that objects are repetitively dropped on to the same surface.

One conclusion is that the Pacific Gull has not learnt this behaviour but that the behaviour is instinctive and has a phylogenetic origin some time before speciation occurred. This is supported by the fact that other gulls of the sub-genus *Larus* exhibit dropping behaviour. Further, it seems highly improbable that such a behaviour could be ontogenetically learnt independently in a number of widely separated species. The dropping behaviour of *L. argentatus* is very similar which indicates that *L. pacificus* must be fairly closely related on these grounds alone. *L. argentatus,* however, is geographically remote from *L. pacificus* and it seems unlikely that

recent allopatric speciation from a common ancestor could have occurred. The phylogeny is further confused in so far as *L. dominicanus,* placed by Fordham (1963) on ethological grounds as a very close relative of *L. argentatus,* exhibits only limited dropping behaviour, confined to dropping sticks into the sea and retrieving them (Fordham, 1963), yet morphologically *L. pacificus* seems much closer to *L. dominicanus* than it does to *L. argentatus.*

If the dropping behaviour in *L. pacificus* and *L. argentatus* has a common phyletic origin, then the behaviour pattern has a high degree of resistance to environmental effects and this in turn suggests a high adaptive value for the behaviour. However, it is hard to see how dropping would increase the adaptive fitness of individuals, particularly in as much as *L. dominicanus,* which occupies a very similar habitat to *L. pacificus,* does not exhibit the same degree of dropping behaviour and yet is closely related to *L. argentatus.*

The phylogeny of *L. pacificus,* is thus very uncertain but more than this, the origin and significance of the dropping behaviour is obscure. Some authors have suggested that dropping is merely play (Wheeler 1943; Tarr 1961; Fordham 1963) and not a feeding behaviour. If this is so, then it poses very important questions on the origins and significance of play behaviour in animals.

The taxonomic and phylogenetic status of *L. pacificus* remains uncertain and it has been my attempt to stimulate some further interest in this handsome gull.

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