Relationships of the masked gulls

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Letters

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Relationships of the masked gulls.—Although molecular biologists may have useful information for ornithologists, they usually overlook the possibility that ornithologists might also be able to tell them something. From work in the field and with museum specimens, I know most of the smaller, more or less masked, southern gulls whose affinities Given et al. (2005) analyzed, and I have some problems with their conclusion that these species are all related to each other and also to the northern Black-headed Gull (*Larus ridibundus*).

First, Given et al. are not the first to suggest that the Black-headed Gull has a southern relative. Murphy (1936:1084) wrote of the Brown-hooded Gull (*L. maculipennis*):

> This Patagonian gull is so closely related to the [Black-headed] Gull of Europe that Hellmayr (1932, 412) believes the relationship between the two might possibly be regarded as subspecific. Aplin (1894, 211) states, furthermore, that in voice and actions the Argentine bird is much like *ridibundus*, a fact that had also been noted by Darwin.

While I agree, I believe that the other small southern gulls, Hartlaub's Gull (*L. hartlaubii*) of South Africa, Silver Gull (*L. novaehollandiae*) of Australia, and Red-billed Gull (*L. n. scopulinus*) and Black-billed Gull (*L. bulleri*) of New Zealand, though all similar as reported by Johnstone (1982), are rather different from the Brown-hooded Gull, and closer to the Brown-headed Gull (*L. brunnicephalus*), which breeds on the "roof" of Asia and winters around its southern and eastern coasts (Bourne and Bundy 1990).

The most distinctive feature of these gulls is not the hood of the breeding season, which seems to come and go according to what allies breed nearby, but the wing pattern, which is visible at a distance in feeding flocks throughout the year. The Brown-hooded and Black-headed gulls, as well as the northern Slender-billed Gull (*L. genei*) and Bonaparte's Gull (*L. philadelphia*), have a white bar at the front of the adult wing. The others, like the gray-headed gulls (*L. cirrocephalus* and *L. c. poiocephalus*) of tropical South America and Africa, have dark wingtips with white marks. The late James Fisher (pers. comm.) suggested to me that the masked gulls must have evolved around the fluctuating water masses of the central Old World in the late Tertiary or Pleistocene. It seems incredible that a southern gull could have reached the Tibetan plateau, so surely the first step in their dispersal was the colonization of the Southern Hemisphere by early brown-headed-type gulls wintering to the south, which gave rise progressively to the tropical gray-headed gulls and the temperate, white-headed Silver Gull and its allies?

We now come to the really interesting question. These allies may have included the Brown-hooded Gull, which is masked and pinkish in the spring. As Given et al. (2005) suggest, this species may then have recolonized the Northern Hemisphere, giving rise not only to the Black-headed and Bonaparte's gulls, which retain a mask but do not turn so pink, but also their nearest ally, the Slender-billed Gull, which has lost its mask but turns pink in the spring. Alternatively, the Brown-hooded Gull may be an independent derivative of the Black-headed Gull in the Southern Hemisphere, the latter having reached South America with the aid of the northeast trade winds. A banded bird from the east Baltic Sea has reached Barbados (Cramp and Simmons 1983).

Considering the molecular evidence provided by Given et al. (2005), it is unfortunate that, like some other authors (Bourne 2002), they seem to have ignored critical forms, especially the well-differentiated central Asian masked gulls that may be derived from the original stock, including not only the Brown-headed Gull but its possible allies, Relict Gull (*L. relictus*), Mediterranean Gull (*L. melanocephalus*), Great Black-headed Gull (*L. ichthyaetus*), and Saunders's Gull (*L. saundersi*). In fact, although they may have included the Prince of Denmark in their version of Hamlet, they seem to have left out his father (reputedly played by Shakespeare himself).

Data in table 2 of Given et al. (2005) imply that Slender-billed and Bonaparte's gulls are early derivatives of the primitive stock left behind in the Northern Hemisphere when it colonized the south; Black-headed and Brown-hooded gulls then showed convergent evolution in the opposite hemisphere after the Black-head Gull moved back north. An alternative interpretation is that the molecular differences are attributable to the degree of isolation of members of a group of birds prone to wide dispersal and frequent hybridization, which has left the forms that are found closer together, notably in Australasia, molecularly more similar than those found farther apart. If so, did the Brown-hooded Gull move back north and give rise to the Black-headed, Slender-billed, and

Bonaparte's gulls, or did one of them or a common ancestor move south independently and give rise to the Brown-hooded Gull? More evidence is required to elucidate this.—William R. P. Bourne, *Ardgath, Station Road, Dufftown, By Keith, AB55 4AX, Scotland, United Kingdom. E-mail: wrpbourne@yahoo.co.uk*

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Relationships of gulls—A reply to Bourne.—All the authors of Given et al. (2005) were trained first and foremost as field ornithologists, and collectively have logged more than 50 field seasons studying southern masked gulls. We also have encountered or collected all the other species, except Brown-headed Gull (*Larus brunnicephalus*). Our purpose in bringing molecular data and methods of phylogenetic inference to bear on the relationships and biogeography of these gulls is that most workers, including Bourne, have tried to infer relationships using morphological similarity as the criterion. As we pointed out, and as Bourne (2006) has acknowledged, this can be fraught with problems because of convergent and parallel acquisition of character states, as well as hybridization (Pereira and Baker 2005). Therefore, we used mitochondrial DNA (mtDNA) sequences because they are informative at this phylogenetic depth and because hybrid transfer of an mtDNA genome into another species is easy to spot, as we have demonstrated elsewhere in our studies (Given 2004).

Unfortunately, we were not able to acquire DNA from *L. brunnicephalus*, which Bourne suggests is more closely related to the small southern gulls than to *L. maculipennis*, which branched basally off the "southern" masked clade in our figure 2 (Given et al. 2005). Using sequences from the control region and part of the cytochrome-*b* gene, Pons et al. (2005) placed *L. brunnicephalus* as sister to the Northern Hemisphere *L. ridibundus*, and this clade was nested as a sister group to the clade (*L. cirrocephalus*, *L. hartlaubii*) within the southern masked gull clade. In other words, these first two species evolved after their Southern Hemisphere common ancestor dispersed into the Northern Hemisphere and could have colonized recently into Asia, including the Tibetan plateau. Why Bourne finds this amazing is hard to understand, because these species migrate annually to these regions from more southerly wintering sites. However, we agree with Bourne that the Australasian species may be derived by a sequential colonization of a South American ancestral form through Africa to Australia and New Zealand; but this depends critically on substantiating the tree topology in figure 1 of Pons et al. (2005) with a larger sequence data set and stronger nodal support.

Although Bourne believed we had ignored critical forms and, thus, had left them out of our "version of Hamlet," it seems we were closer to Shakespeare than he could have imagined. Pons et al. (2005) showed convincingly that *L. relictus*, *L. melanocephalus*, *L. ichthyaetus*, and *L. saundersi* are grouped in a well-differentiated sister clade to the southern masked gulls, thus ruling out Bourne's speculation that they should be included in the play. Furthermore, our studies and those of Pons et al. (2005) reject Bourne's additional speculations about *L. brunnicephalus* moving back north to give rise to *L. ridibundus*, *L. genei*, and *L. philadelphia*, or that one of these species or their common ancestor gave rise to *L. brunnicephalus*. We agree that *L. genei* and *L. philadelphia* are descendents of a common ancestor, most likely from the Northern Hemisphere, but we do not know how Bourne deduced this from our table 2 (Given et al. 2005), which lists our polymerase chain reaction and sequencing primers. Although it is easy to propose biogeographic scenarios of how supposedly closely related birds evolved on the basis of their appearance, this is no replacement for hypothesis-testing science with phylogenetic analysis of large data sets, inference of ancestral areas and, hence, likely dispersal routes.—Allan J. Baker, *Department of Natural History, Royal Ontario Museum, Toronto, Ontario M5S 2C6, Canada, and Department of Zoology, University of Toronto, Toronto, Ontario M5S*