TABLE 3 In-hand assessment of dominant iris colour in three samples of adult Mongolian Gulls *Larus (cachinnans) mongolicus* trapped at nests at Lake Baikal, Siberia, Russia, in May-June 1992 (percentage of sample size). [a] Several colonies. [b] Different colony

	Maloye More [a] 31 May-7 June (%)	Maloye More [b] 15 June (%)	North-eastern Lake Baikal 26 June (%)	Pooled (%)
Yellow (grey < 10%)	28	28	42	29
Yellowish (grey 10-50%)	44	42	8	41
Pale grey (grey > 50%)	21	21	33	22
Dark grey	5	9	-	6
Brown	1	-	17	2
Sample (n)	97	43	12	152

only the intensity but also the tone of the coloration changes. He hypothesized that these changes are related to external conditions (food composition) and age. It is a largely acknowledged fact that carotine-rich food can enhance the expression of the carotinoid colouring matter in the legs of gulls (cf Lönnberg 1933). Any relation with age, however, remains to be proven.

I examined in the hand the legs and feet of 152 birds of most colonies I visited at Lake Baikal. It readily appeared that the fleshy-pink colour usually was tinged with some yellow pigment over a very variable extent. Yellow was more often found on and around the knee and on the rear leg while webs often were of a deeper pink (one pink-legged bird with orange webs was most unusual). Some birds exhibited either bright pink or yellow (pale to bright, then resembling *michahellis*) legs but most showed a variable leg colour. This rendered any reference to colour charts rather subjective and I relied on my own assessment when establishing the dominant leg colour in the examined adult birds. Of them, 15.8% had flesh-to-pink legs, 76.3% yellowish-flesh, 5.9% pale yellow and 2% bright yellow.

In the field, the perception of the yellow tinge varies markedly, depending on the light incidence and on whether the legs are wet or not (yellow shows better on wet legs). Even birds which seem to have yellow legs when looked at them with the naked eye occasionally showed pinkish legs through binoculars. The field score nevertheless matched the in-hand results, with almost all 555 birds studied in the field showing 'pale' (ie, flesh or pink more or less obviously admixed with yellow) legs and only seven (1.3%) yellow legs.

Discussion

Mantle colour and wing-tip pattern

On the basis of the type specimen collected in north-western Mongolia, Sushkin (1925) described the mantle of *mongolicus* as being darker than that of *cachinnans*, a statement repeated by Stepanyan (1990). Dement'ev (1951) described the mantle colour of *mongolicus* as similar to that of *vegae*. My research on museum skins showed that some birds of north-western Mongolia are on the darker side of the variation found in *mongolicus*, a tentative explanation of Sushkin's description. Many *mongolicus*, however, are paler than this and their mantle colour overlaps with that of both *cachinnans* and *vegae* (see figure 1). Birds of the latter taxon can, however, be paler than any *mongolicus*, particularly in the northernmost part of the range of *birulai* (unpublished data from museum study).

The grey inner tongue on p10 was mentioned by Sushkin (1925) but no information was available on the wing-tip pattern of *mongolicus*, except for Stegmann's (1934) statement of seven to eight primaries with black and the presence of a subterminal black bar on p10, and complementary figures given by Panov & Monzikov (2000). My reference to a much larger set of birds showed that the inner tongue on p10, although usually pale grey (ie, paler than in *vegae*, which is in agreement with Sushkin's original description), is darker in some birds and then resembles the pattern found in *vegae* and *birulai*. Also, the number of primaries with black (six to nine) is more variable than previously thought and the presence of a subterminal black bar on p10 is no absolute rule.

Obviously, the larger the number of birds studied, the better the understanding of the phenotypic variation. Our knowledge, first based on small samples (either museum series or migrants of known origin), has strongly increased by studying birds in colonies (see, for instance, Buzun 1993, Filchagov 1993, Liebers & Dierschke 1997, Liebers & Helbig 1999, Panov & Monzikov 2000). This also holds for measurements, the range of which often increases with sample size (mean values are less affected).

101 Mongolian Gull / Mongoolse Meeuw *Larus (cachinnans) mongolicus*, adult, Lake Baikal, Siberia, Russia, June 1992 *(Pierre Yésou)*. Dark-eyed bird. Note that red gonydeal spot does not reach upper edge of lower mandible

102 Mongolian Gull / Mongoolse Meeuw *Larus (cachinnans) mongolicus*, adult, Lake Baikal, Siberia, Russia, June 1992 *(Pierre Yésou)*. Dark-eyed bird. Note that red gonydeal spot does not reach upper edge of lower mandible. Note also dark bill-marking

103 Mongolian Gull / Mongoolse Meeuw *Larus (cachinnans) mongolicus*, adult, Lake Baikal, Siberia, Russia, June 1992 *(Pierre Yésou)*. Pale-eyed bird. Note that red gonydeal spot reaches upper edge of lower mandible. Such an extension of red is only found in a minority of birds. Note also small dark mark on upper mandible

104 Mongolian Gull / Mongoolse Meeuw *Larus (cachinnans) mongolicus*, adult, Lake Baikal, Siberia, Russia, June 1992 *(Pierre Yésou)*. Pale-eyed bird

Bare-part coloration

The bare-part coloration of *mongolicus* I established agrees with most previous descriptions in the literature. The vermilion-red orbital ring was mentioned in Sushkin's (1925) original description. The variability of iris and leg colours is known since Madge (1985). It remained, however, unquantified until Pyzhianov & Tupitchyn (1992) and this study.

Such a large variation in bare-part coloration in one population may be surprising to western birders accustomed to colonies inhabited by uniformly looking Herring *L argentatus*, Yellow-legged or Lesser Black-backed Gulls. However, the fact is that highly variable grey or brown pigmentation over the yellow iris occurs in breeding birds of all Asian taxa of the *argentatus-cachinnans-fuscus* complex, seemingly being the least marked in *vegae* (Filchagov 1993, Liebers & Dierschke 1997, Liebers & Helbig 1999, Panov & Monzikov 2000, Andrey Filchagov and V I Grabovsky pers comm, pers obs). It also occurs, although very rarely leading to grey-looking irides, in *michahellis* (N Baccetti pers comm). Regarding the variability of leg colour, this is also found in *cachinnans* (Liebers & Dierschke 1997, V I Grabovsky pers comm) and is commonplace in northern Siberia, from north-western Taimyr to the Lena delta at least, over the range of *birulai* (eg, Yésou & Hirschfeld 1997).

Until Hirschfeld (1992) and Madge (1992), little attention has been paid to the frequency and size of dark bill-markings in adult large gulls. This is the first time that these are described for *mongolicus*. Such bill-markings are shared, in variable size and proportion, with the Asian taxa of the *argentatus-cachinnans-fuscus* complex (Filchagov 1993, Liebers & Dierschke 1997, Yésou & Hirschfeld 1997, Panov & Monzikov 2000).

Systematics

Recently proposed systematic arrangements (eg, Devillers & Potvliege 1981, Haffer 1982, Devillers 1983, Stepanyan 1990, del Hoyo et al 1996, Sangster et al 1999) have generally presented *mongolicus* as a subspecies of *cachinnans*, in classifications encompassing (almost) all the southern taxa of Palearctic yellow-legged large white-headed gulls under *cachinnans*. This treatment is based on the supposed continuity in distribution (as given in oversimplified distribution maps like, for instance, the one in Yésou & Hirschfeld 1997), similarity in mantle colour and possibly also in the white head in winter shown by most southern taxa (*atlantis*, a subspecies of *cachinnans* according to some of the above-mentioned authors, is dark hooded in winter). This, however, remains a hypothetical classification, pending further research on the relationships between *cachinnans* and neighbouring taxa (eg, Yésou et al 1994, Sangster et al 1999).

On the basis of the now available information, it is clear that there are marked phenotypic differences between *mongolicus* and *cachinnans*, particularly in wing-tip pattern (the number of primaries with black, the grey inner tongue and subterminal black bar on p10; see, for instance, Garner & Quinn (1997) and Jonsson (1998) for a description of the wing-tip of *cachinnans*) and underwing colour (pale grey in *mongolicus* and white in *cachinnans*). Such differences are sufficient to consider *mongolicus* and *cachinnans* as different species under the Phylogenetic Species Concept (PSC). Proponents of the Biological Species Concept (BSC) could argue that intergradation remains a possibility in a still undocumented contact area. If intergradation ever occurs, it should in any case be limited by the low density of both *mongolicus* and *cachinnans* in the neighbouring part of their respective breeding ranges (Pyzhjanov & Tupitsyn 1994, Pyzhianov 1996, Andrey Filchagov pers comm). Occasional mix-pairing has no taxonomic value, even under the BSC (see, for instance, the occasional *argentatus x graellsii* or *argentatus/graellsii x michahellis* pairs in western Europe; Yésou 1991). Furthermore, a preliminary mitochondrial DNA analysis (Crochet 1998) showed that *mongolicus* largely differs genetically from *cachinnans*, thus invalidating the hypothesis of the existence of significant gene flow between the two taxa. In fact, *mongolicus* is genetically closer to the Siberian taxa *heuglini* and in particular *birulai* of Taimyr (Crochet 1998, who had no access to material of eastern *birulai* and *vegae*).

Also, although no comparative analysis has been performed to elucidate vocal relationships in Siberian gulls, the vocalizations of *mongolicus* clearly differ from those of *cachinnans* (according to observers with a hearing ability better than mine) and seem closer to those heard in Taimyr (Andrey Filchagov pers comm).

Should *mongolicus* be considered as a full species or should it be considered as a subspecies of *vegae*, together with *birulai*? The fact is that these taxa resemble each other although differences have been noted, particularly in wing-tip pattern (the number of primaries with black, the size and colour of the tongue on p10, proportion of birds without a complete subterminal black bar on p10) and in winter-plumage markings.

The ranges of *vegae* (including *birulai*) and *mongolicus*, which breed in the Arctic tundra and at lakes in the steppe belt, respectively, are separated by a more than 1000-km wide taiga belt where no large gulls are known to breed. The breeding environment of *mongolicus* and *vegae* nevertheless shows marked similarities, due to the late and cold spring at Lake Baikal. As an illustration of this, the behavioural adaptation to low temperatures shown by fleas parasiting nests of *mongolicus* at Lake Baikal is otherwise known only from fleas of Arctic and Antarctic seabirds (Guiguen et al 1993). Could then some spring migrants, which regularly stop over at Lake Baikal when *en route* to Taimyr and possibly western Yakutia (Sergey Pyzhianov pers comm), be attracted by seemingly favourable environmental conditions and stay to breed at Lake Baikal, then leading to some degree of intergradation? This seems, however, unlikely as Arctic birds start to breed 35-45 days later than Lake Baikal birds