Phenotypic variation and systematics of Mongolian Gull

Pierre Yésou

In memory of Vladimir Vladimirovich Leonovich (1924-98)

Since Peter Grant's pioneering work (cf Grant 1982, 1986), the knowledge of the identification and phenotypic variation of the gull taxa belonging to the *Larus argentatus-cachinnans-fuscus* complex has dramatically increased in Europe. Initially, this progress benefited from studies conducted on breeding grounds where mixed gull colonies allowed the comparison of different taxa (eg, Dubois & Yésou 1984). Then, the development of colour-ringing schemes gave multiple opportunities to study the appearance of birds of known origin, sometimes at a great distance of the ringing site. Particularly remarkable was the case of Pontic Gull *L (cachinnans) cachinnans* of which the field characters were first established from birds ringed in Black Sea colonies and subsequently observed in Germany during the winter season (Klein 1994, Gruber 1995). However, because only a small number of birds at the limit of the species' winter range had been studied, the phenotypic variation found was not representative for the species. Therefore, further studies of birds on the breeding grounds were needed to describe in detail the phenotypic variation of this taxon (Klein & Gruber 1997, Liebers & Dierschke 1997).

The identification of the other taxa breeding in the former USSR remains far less easy as most descriptions, based on birds seen on the breeding grounds, are anecdotal (eg, Pleske 1928, Dement'ev 1951) or even disputable. (Unfortunately, according to knowledgeable Russian ornithologists, the review by Judin & Firsova (1990) is far from giving a reliable account of the *argentatus-cachinnans-fuscus* complex and will not be considered here.) Also, although the skin collection in the Natural History Museum at Tring, England, has been a reference for decades, it now suffers from the doubtful validity of the Meinertzhagen collection (British Ornithologists' Union 1997) and the erroneous labelling of some skins (Lars Jonsson pers comm). The collections in Russian museums harbour rich reference material but have rarely been visited by western gull students. Moreover, very few western observers have experience with the Asian taxa on their breeding grounds (eg, Liebers & Dierschke 1997, Yésou & Hirschfeld 1997).

Further, the identification of the Asian taxa at migration stopovers and on wintering grounds still remains speculative in many cases. For instance, birds looking as dark mantled as Lesser Black-backed Gull *L graellsii* used to be identified as Mongolian Gulls *L (c) mongolicus* in Hong Kong (Kennerley 1987) but are now called Taimyr Gulls *L (heuglini) taimyrensis* there as well as in Japan (Kennerley et al 1995, Hoogendoorn et al 1996) although the only Asian taxon with such a dark mantle is the western Siberian Heuglin's Gull *L (h) heuglini* (Yésou & Hirschfeld 1997). Detailed descriptions based on birds studied on the breeding grounds are available for only two Asian taxa, ie, Armenian Gull *L armenicus* (eg, Buzun 1993, Filchagov 1993, Liebers & Helbig 1999) and Baraba Gull *L (c) barabensis* (Panov & Monzikov 2000, who suggested that this taxon is a subspecies of *heuglini*), and are therefore still needed for the other Asian taxa.

In this article, the phenotypic variation of adult *mongolicus* is described and its systematic implications are discussed. It is mainly based on studies of birds in colonies at Lake Baikal, Siberia, Russia, in the spring of 1992 (24 May-30 June) and of skins at the Moscow Zoological Museum, the Zoological Institute of St Petersburg and the field station of the University of Ulan Ude in the Selenga delta, Lake Baikal. Moreover, I benefited from the experience and guidance of Sergey Pyzhianov who has been studying colonies of *mongolicus* at Lake Baikal for years (and who has developed an efficient trapping technique for ringing *mongolicus*, by putting α-chloraline baits at the nest), allowing me to visit all main colonies, except those in marshes at the north end of the lake, and to handle more than 150 adult birds.

Distribution and numbers

Mongolicus has a patchy breeding distribution, ranging from south-eastern Altai to north-eastern

85 Part of Bolshoye Toïnik, Maloye More, north-western Lake Baikal, Siberia, Russia, May 1992 *(Pierre Yésou)*. This island holds main colony of Mongolian Gull / Mongoolse Meeuw *Larus (cachinnans) mongolicus* (c 1000 pairs). Egg laying starts on c 5 May when ice still covers large parts of Lake Baikal. Temperatures of below 0°C regularly occur at night up to mid-June. Water surface temperature is still below 10°C by late June, except in some sheltered coastal bays **86** Mongolian Gulls / Mongoolse Meeuwen *Larus (cachinnans) mongolicus*, Maloye More, north-western Lake Baikal, Siberia, Russia, June 1992 *(Pierre Yésou)*

Mongolia and the western part of north-eastern China (Dement'ev 1951). The isolated breeding population of 'Herring Gulls' at Lake Khanka, situated at the border of easternmost China and Far Eastern Russia, has also been claimed to belong to this taxon (Pyzhjanov & Tupitsyn 1994) but no systematic study of this population has been published so far.

According to Pyzhjanov & Tupitsyn (1994) and Pyzhianov (1996), only 750-1200 pairs are breeding in Altai, western Mongolia and Tuva (Tuvinskaya) Autonomous Region. There are c 3600 pairs at Lake Khubsugul in northern Mongolia and c 7200 pairs at Lake Baikal. The lakes of Transbaikalya (Toresiskie Lakes) and north-eastern Mongolia and Hukun Nor in nearby China harbour 7500-10 000 pairs. The total population of *mongolicus* is estimated to be only 19 000-22 000 pairs (excluding the population of 'Herring Gulls' at Lake Khanka), ie, less than 100 000 birds (including immature and non-breeding birds). *Mongolicus* is clearly a scarce gull.

Birds ringed at Lake Baikal have been recovered on the Pacific coast of Russia in autumn, suggesting an eastward overland migration route after the breeding season (Sergey Pyzhianov pers comm). The entire population probably winters in coastal south-eastern Asia. *Mongolicus* has indeed been positively recorded in Hong Kong, Japan and South Korea (Kennerley et al 1995, Hoogendoorn et al 1996, Lethaby et al 2000). It has been claimed in Pakistan by Roberts (1991) who relied only on bare-part coloration, a character of little or no diagnostic value in this case (Yésou & Hirschfeld 1997). Therefore, the occurrence of *mongolicus* in western Asia remains undocumented.

Phenotypic variation

The original description of *mongolicus* by Sushkin (1925) is as follows: 'Above as *vegae* [Vega Gull *L vegae*], darker than *cachinnans* ([from] Kirghiz steppe and Lake Zaissan), feet pink, orbital ring vermilion-red; grey wedges of the inner webs of primaries shorter and darker than in *cachinnans* but lighter than in *vegae*. Wing male 462-480, female 442-450, tarsus 65-70, middle toe 52-58. From 8 specimens, South-Eastern Altai and NW Mongolia. Type: male ad., 9.VII.1914, Lake Uring-noor, NW Mongolia' (Sushkin's descriptions of new taxa are both in Russian and English).

Further details were given by Stegmann (1934). He studied 27 skins of adult birds and mentioned a wing-tip pattern darker than in *cachinnans* and closer to Birula Gull *L v birulai*, with black on the seven or eight outermost primaries and a subterminal black bar on p10 (primaries are numbered ascendently). The latter taxon was given the name *birulai* (Pleske 1928), in honour of the great sailor and Arctic explorer Birula, hence the male gender. Regrettably, many authors kept using the name '*birulae*', a misspelling by Stegmann (1934). *Birulai* is hardly differentiated from *vegae*, except for the variable leg colour and darker iris in some birds. It is treated as either a synonym of *vegae* or a subspecies of it (eg, Stepanyan 1990, Kennerley et al 1995, Yésou & Hirschfeld 1997, Panov & Monzikov 2000).

Thereafter, information on the phenotype of *mongolicus* remained scanty for a long time. Dement'ev (1951), in his review of the gulls of the USSR, simply stated that the plumage is similar to that of *vegae* and summarized Stegmann's (1934) description of the wing pattern. The most recent Russian systematic review (Stepanyan 1990) was even more anecdotal: 'mantle colour a little darker than in *cachinnans*, leg colour varying from pink-grey to yellow'. In his review of the variation of the Palearctic large white-headed gulls, Devillers (1983) simply mentioned a mantle similar to or darker than that of Yellow-legged Gull *L michahellis*, with more black on the primaries.

Then, western pioneers began to visit the breeding grounds of *mongolicus*, in particular Steve Madge. He described the iris as 'definitively' dark (Madge 1983), before acknowledging that the iris in fact varies from almost white to very dark (Madge 1985). Also, he found the legs to be fleshy-pink in most adult birds (Madge 1985). Grant (1986) mentioned that birds seen in Mongolia were pink legged, some yellowish legged, and seemed to have a dark iris.

Lastly, Pyzhianov & Tupitchyn (1992) published a short article, unfortunately hardly accessible to western gull students, that is the most detailed publication on the phenotypic variation of *mongolicus* to date. They mostly focused on leg colour which varied from pink to yellow and orange, none of these colours occurring in more than half of the adult birds at any of their study plots. Further articles on Asian gulls (eg, Kennerley et al 1995, Yésou & Hirschfeld 1997) were no more informative, with the exception of Panov & Monzikov (2000) who gave information on the wing-tip pattern of *mongolicus*.

87 Mongolian Gulls / Mongoolse Meeuwen *Larus (cachinnans) mongolicus*, Maloye More, north-western Lake Baikal, Siberia, Russia, June 1992 *(Pierre Yésou)*

88 Mongolian Gulls / Mongoolse Meeuwen *Larus (cachinnans) mongolicus*, Maloye More, north-western Lake Baikal, Siberia, Russia, June 1992 *(Pierre Yésou).* Note that incidence of light influences perception of mantle colour

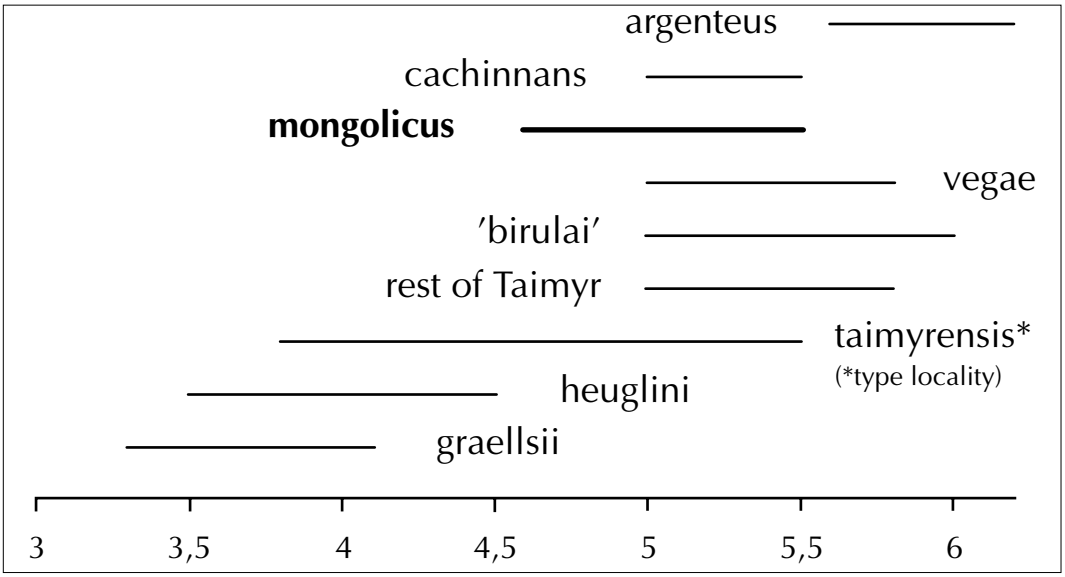

FIGURE 1 Munsell's index (37-step scale) of colour refraction of mantle colour for selected Palearctic taxa of *Larus argentatus-cachinnans-fuscus* complex. Darkness of grey mantle decreases from left to right. Only specimens of range given in type description, ie, lower reaches of Yenisei river in south-western Taimyr, have been included in Taimyr Gull *L (heuglini) taimyrensis*. Specimens used for Birula Gull *L vegae birulai* came from western Yakutia and east to Kolyma delta, those for Vega Gull *L vegae* from east of Kolyma river to Chukchi peninsula. *Argenteus*, not representing a valid subspecies according to Dutch committee for avian systematics (CSNA) (Sangster et al 1999), refers to western and paler population of Herring Gull *L argentatus*. Data from Barth (1966) and by courtesy of Andrey Filchagov (in litt) and Sergey Pyzhianov (in litt)

Results

Overall appearance

Mongolicus is a large and heavy gull, with a mean weight of 1140 g at the time of incubation (880-1580 g, n = 11, unsexed). The wingspan, calculated from freshly dead birds (positioned as live birds), is 140-160 cm (with four females ranging from 138 to 146 cm and five males from 146 to 156 cm). Further measurements are given in table 1.

TABLE 1 Measurements (mm) of 42 adult (unsexed) Mongolian Gulls *Larus (cachinnans) mongolicus* trapped at nests at Lake Baikal, Siberia, Russia, on 2-26 June 1992. Two different measurements of tarsus were taken: *1* from centre of both joints as usually done on skins ('museum'); and *2* from outer extremity of both articulations which is most convenient way when measuring live birds ('field')

	Range	Mean ± SD
Culmen	48.0-61.7	54.9 ± 3.0
Gonys height	16.6-22.0	19.0 ± 1.4
Head plus bill length	115-139	126.3 ± 6.1
Tarsus (museum)	63.2-79.3	68.9 ± 3.2
Tarsus (field)	67.8-87.8	80.5 ± 3.9
Folded wing	432-494	458.5 ± 14.8

It is a large-chested, broad-necked and large-billed bird. The bulky appearance is partly tempered as the birds often stand rather upright on their long legs while the long wings give them an attenuated rear body.

The mantle is mid-grey, with Munsell's index of colour refraction ranging from 4.5 to 5.5 in 32 birds of Lake Baikal (Sergey Pyzhianov pers comm). This means that *mongolicus* is distinctly paler than *heuglini*, the mantle colour of many birds matching that of *cachinnans* as well as that of many *vegae* (including *birulai*) and *taimyrensis* (figure 1).

The wing-tip is among the darkest of the Asian taxa: usually seven (ranging from six to nine) outer primaries show black, sometimes extending onto the outermost coverts. There are two white mirrors, less often only one. Large white scapular and tertial crescents (13-27 and 19-42 mm wide, respectively, in 44 birds) are shown on the folded wing. The rest of the plumage is white, except for the pale grey underwing.

In contrast to the well-marked winter plumage

89-91 Mongolian Gull / Mongoolse Meeuw *Larus (cachinnans) mongolicus*, adult, Lake Baikal, Siberia, Russia, June 1992 *(Pierre Yésou)*. Note distinct white trailing edge to wing **92** Mongolian Gull / Mongoolse Meeuw *Larus (cachinnans) mongolicus*, adult, Lake Baikal, Siberia, Russia, June 1992 *(Pierre Yésou)*. Note contrast between pale grey coverts, darker grey band formed by bases of remiges and white (almost translucent) trailing edge to wing

of *vegae* and birds of Taimyr, *mongolicus* only shows poorly developed dark streaks on the head after the post-breeding moult (Dement'ev 1951). Birds still present at Lake Baikal in November show a virtually all-white head and neck (Sergey Pyzhianov pers comm).

The bill is yellow with a red gonydeal spot and shows variable dark markings. The iris varies from yellowish-white to dark grey-brown and the legs from pale flesh to bright orange. All these variations, and those in the wing-tip pattern, will be detailed in the next paragraphs.

Wing-tip pattern

According to a study of 89 adult-plumaged birds in the hand in colonies at Lake Baikal (an examination of museum skins did not result in additional information), at least some black occurs on the six (p5-10) to nine outermost primaries (p2-10), most often on the seven outermost ones (p4-10), with a different number of black-tipped primaries in the two wings in c 10% of the birds (table 2). The black extends onto some or all outermost primary-coverts in 25 out of 84 birds with black on at least seven outer primaries. Such an extension of black onto the outer coverts (which otherwise always have a black shaft) was not observed in birds with only six black-tipped primaries. This could, however, be explained by the sample size. The proportion of adult birds with at least some black markings on the outer coverts is c 30%. Due to both the number of

93 Mongolian Gulls / Mongoolse Meeuwen *Larus (cachinnans) mongolicus*, adults, Lake Baikal, Siberia, Russia, June 1992 *(Pierre Yésou)*. Note contrast between pale grey underwing-coverts, darker grey band formed by bases of remiges and white (almost translucent) trailing edge to wing **94** Mongolian Gulls / Mongoolse Meeuwen *Larus (cachinnans) mongolicus*, adults, Lake Baikal, Siberia, Russia, June 1992 *(Pierre Yésou)*. Note distinct white trailing edge to wing

TABLE 2 Number of black-tipped primaries in Mongolian *Larus (cachinnans) mongolicus*, Vega *L vegae* and Baraba Gulls *L (c) barabensis*. Data on *barabensis* and *vegae* from Panov & Monzikov (2000) and from skins at Zoological Institute of St Petersburg, Russia, respectively. [a] Number of black-tipped primaries can differ by one, thus bird showing, for instance, eight black-tipped primaries in one wing and nine black-tipped primaries in other wing is scored 8.5. [b] *Vegae* includes Birula Gull *L v birulai* but no birds of Taimyr have been considered in sample. [c] Panov & Monzikov (2000) did not look for asymmetry in number of black-tipped primaries. Also, their small sample did not include any specimen with nine black-tipped primaries; however, such birds do occur (Yésou & Hirschfeld 1997)

Number of black-tipped primaries	*mongolicus* (%)	*vegae* [b] (%)	*barabensis* (%)
8.5 [a]	1	-	- [c]
8.0	11	-	39
7.5 [a]	8	-	-
7.0	74	36	39
6.5 [a]	-	10	-
6.0	6	42	22
5.5 [a]	-	4	-
5.0	-	8	-
Sample (n)	89	50	18

black-tipped primaries and the frequency of black on the coverts, the wing-tip of *mongolicus* is among the darkest of the Asian taxa of the *argentatus-cachinnans-fuscus* complex, averaging darker than in *vegae*. Only *barabensis* more frequently shows black on eight primaries (table 2).

The tongue on the inner web of the outermost primary (p10) is pale grey. It is usually rather long, ending 9-15 cm from the primary-tip (see also Panov & Monzikov 2000) and covering about two-thirds of the width of the inner web. It is, however, shorter (ending up to 20 cm from the primary-tip) and narrower and somewhat darker in some birds, particularly those with eight or nine primaries with black, then resembling the usual *vegae* and *birulai* pattern. In such birds, the pale tongue can be less distinctly delineated from the black inner part of the web, being suffused with blackish.

White mirrors usually occur on both p9 and p10 but seven out of 67 (10%) adult-plumaged birds examined showed only a white mirror on p10.

The white mirror on p10 invariably forms a complete band covering the full width of both webs. It is usually separated from the white wing-tip by a subterminal black bar of 5-25 mm width although this bar was absent in two birds and incomplete in four others. The subterminal black bar was thus lacking, at least in part, in 9% of the handled birds. By way of comparison, this bar was incomplete or absent in 13 out of 45 (29%) skins of *vegae* and *birulai*, and it is usually absent in *cachinnans* (eg, Garner & Quinn 1997, Panov & Monzikov 2000). The length (measured along the feather-shaft) of the white mirror on p10 varied from 19 to 47 mm (with a mean of 36.4 mm), being 34-40 mm in half of the sample. It was worn at the tip and 48 and 55 mm long, respectively, in the two birds without a subterminal black bar.

The white mirror on p9 extends onto both webs (68% of 60 birds with a white mirror on p9) or is limited to the inner web (32%), exceptionally to the outer web (one case was mentioned by Panov & Monzikov 2000, ie, 1% of 92 birds, pooling their and mine samples). It forms either a complete white band (nine birds, 15%) or more often one or two white spots of variable pattern: white on both webs, extending to the border of the inner web (28%); white on both webs, fully surrounded with black (25%); white on the inner web only, extending to the border of the web (12%); white on the inner web only, fully surrounded with black (20%). The maximum length of the white mirror on p9 (measured parallel to the feather-shaft) varied from 6 to 31 mm (with a mean of 17.7 mm), being 10-22 mm in 77% of the cases.

No strong statistical relationship was found between the respective sizes of the white mirrors on p9 and p10 (n = 60).

Bill colour

The bill is yellow, varying from pale yellow to bright orange-yellow, commonly with a paler tip. The red gonydeal spot usually does not reach the upper edge of the lower mandible, falling short by 2-3 mm. Dark markings (spots or broken lines in front of the red gonydeal spot) occur in one out of three birds. Of 107 adult-plumaged birds trap-

95-96 Mongolian Gull / Mongoolse Meeuw *Larus (cachinnans) mongolicus*, adult, upperwing, Lake Baikal, Siberia, Russia, June 1992 *(Pierre Yésou)*. Typical wing-tip patterns. Note large white mirror and subterminal black bar (white tip more or less abraded) on p10 and mirror of variable extent on p9

97 Mongolian Gull / Mongoolse Meeuw *Larus (cachinnans) mongolicus*, adult, upperwing, Lake Baikal, Siberia, Russia, June 1992 *(Pierre Yésou)*. Less common wing-tip pattern. Note incomplete subterminal black bar on p10

98 Mongolian Gull / Mongoolse Meeuw *Larus (cachinnans) mongolicus*, (sub)adult, upperwing, Lake Baikal, Siberia, Russia, June 1992 *(Pierre Yésou)*. Wing-tip pattern shown by a minority of birds. White mirror on p9 is missing. Note black markings on outer greater coverts in this otherwise fully adult-plumaged breeding bird

99 Mongolian Gull / Mongoolse Meeuw *Larus (cachinnans) mongolicus*, (sub)adult, upperwing, Lake Baikal, Siberia, Russia, early June 1992 *(Pierre Yésou)*. This bird shows very dark wing-tip pattern, without white mirror on p9, and with many dark markings on outer coverts. Although bird was trapped at nest, its advanced moult stage (growing inner primaries and in particular fresh unmarked outer median coverts contrasting with older, brown-tinged, surrounding feathers) suggests that it has not yet reached fully adult plumage **100** Mongolian Gull / Mongoolse Meeuw *Larus (cachinnans) mongolicus*, adult, underwing, Lake Baikal, Siberia, Russia, May 1992 *(Pierre Yésou)*. Note contrast between mid-grey remiges, paler grey greater and median coverts, and white lesser coverts. Shadow is partly masking pale grey tips to primaries that appear white and translucent when seen from below in flight

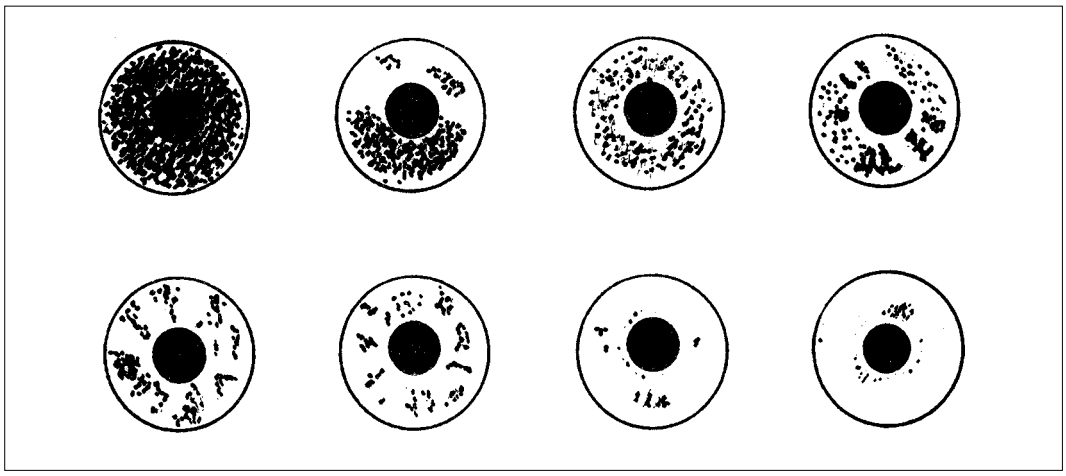

FIGURE 2 Variability of iris pigmentation in Mongolian Gull / Mongoolse Meeuw *Larus (cachinnans) mongolicus* at Lake Baikal, Siberia, Russia (redrawn from field sketches of birds in hand) *(Pierre Yésou)*

ped at nests and examined in the hand, 17% showed dark markings on the upper mandible only and 15% on both mandibles (in one extreme case, the markings formed an almost complete dark bill band of c 3 mm width).

Eye colour

The orbital ring was vermilion-red in all adult-plumaged birds I examined in the hand.

Pyzhianov & Tupitchyn (1992) described the iris as ranging from pale ashy-grey to olive-grey to dark smoky-grey. 54 and 68% of their samples of Lake Baikal and Lake Khubsugul, respectively, were pale eyed. They found no correlation between iris and leg colours (a point I did not check).

In the birds I examined in the hand, the iris was dull yellow (very pale, almost whitish, in some), usually peppered with grey (pale bluish-grey to dark grey-brown) minute spots in variable density over a much variable extent of the iris surface. In some birds, the grey was peppered quite uniformly over the iris, often with a few small aggregations forming dark marks on the overall pale eye. In other cases, dense grey spots formed one or more large dark areas over the eye while sparse spotting left the yellow iris colour showing over the rest of it (figure 2). Eye darkness is not sex related. Pale eyes and dark eyes are found in both males and females and pairing occurs irrespective of the iris colour (of eight pairs, the male had darker eyes than the female in four cases and the female had darker eyes than the male in three cases; the partners of the remaining pair showed similarly coloured eyes).

Such a high variability of iris pigmentation makes it difficult to accurately comment on the eye colour of *mongolicus*. In a first analysis of 43 birds in the hand, I classified 28% of them as pale eyed, 42% as intermediate and 30% as dark eyed. A more detailed analysis, including two more samples (table 3), showed that nearly one-third was pale eyed while grey spots covered more than half of the iris surface in another third. Really dark-eyed birds, however, accounted for less than 10%.

In the field, colour assessment is less easy. Of 236 adult birds studied through binoculars or telescope, 89% were classified as yellow or yellowish eyed. It thus seems that eyes classified as pale grey in the hand are perceived as yellowish in the field while dark-eyed birds accounted for only 4% in the field sample (not statistically different from the 8% found during the in-hand examination).

Leg colour

Pyzhianov & Tupitchyn (1992) described the high degree of variability of the leg colour at Lake Baikal and in Mongolia. They examined various series of birds in the hand, comparing the leg colour with colour charts. Grey legs accounted for 22-40%, yellow 13-27%, pink 21-46% and flesh 4-10%, while 6-30% of the birds showed mix-coloured legs. The proportion of each colour type varied between colonies and from one year to the other in a given colony. Also, in a proportion of birds, the leg colour showed temporal changes. According to Pyzhjanov (1998), not

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

(Filchagov et al 1992, pers obs) and they are presumably hormonally not in breeding condition when passing through the Lake Baikal area.

In conclusion, species status should be given to *mongolicus* under both the PSC (diagnostic differences in, for instance, wing-tip pattern and winter-plumage markings) and the BSC (not interbreeding freely to any significant degree). It then appears that the Asian taxa until recently considered as subspecies of *cachinnans* are now better taken as full species, namely *armenicus*, *barabensis* and *mongolicus* (Buzun 1993, Filchagov 1993, Liebers & Helbig 1999, Panov & Monzikov 2000, this study), as Panov & Monzikov's (2000) suggestion that *barabensis* is a subspecies of *heuglini* is easily rejected on arguments similar to those I have developed about the relationships between *mongolicus* and other taxa.

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Samenvatting

FENOTYPISCHE VARIATIE EN SYSTEMATIEK VAN MONGOOLSE MEEUW Mongoolse Meeuw *Larus (cachinnans) mongolicus* broedt van Zuidoost-Altai naar Hukun Nor in Noordoost-China, over Noord-Mongolië, het Tuva Autonome Gebied, het Baikalmeer en Transbaikalia. (De taxonomische verwantschap van de Zilvermeeuwen van het Khankameer (gelegen in het grensgebied van Oost-China en het Russische Verre Oosten) is onbekend.) De gehele populatie, geschat op slechts 19 000-22 000 paren (met inbegrip van 7200 paren in het Baikalmeer) of minder dan 100 000 vogels (met inbegrip van jonge en niet-broedende exemplaren), overwintert waarschijnlijk in de kustgebieden van Zuidoost-Azië.

In het voorjaar van 1992 onderzocht de auteur de fenotypische variatie van broedende *mongolicus* in het Baikalmeer. Dit onderzoek had onder meer betrekking op meer dan 150 op of bij nesten gevangen vogels. *Mongolicus* is een grote en zware meeuw, met een gemiddeld gewicht van 880-1580 g tijdens de broedtijd; de vleugelspanwijdte bedraagt 140-160 cm. Hij heeft een middengrijze ('mid-grey') mantel (de Munsell index, een maat voor de refractie van kleuren, varieert van 4.5 tot 5.5). Dit betekent dat *mongolicus* een duidelijk lichtere mantel heeft dan Heuglins Meeuw *L (heuglini) heuglini*. Hierin komen vele *mongolicus* overeen met vele Vegameeuwen *L vegae* (met inbegrip van Birulameeuw *L v birulai*) en Taimyrmeeuwen *L (h) taimyrensis*. *Mongolicus* heeft in vergelijking met andere Aziatische taxa een van de donkerste vleugelpunten. Zwart bevindt zich gewoonlijk op de zes tot negen buitenste handpennen, het vaakst op de zeven buitenste handpennen). Het zwart komt soms voor tot op de buitenste handdekveren. Gewoonlijk komt een witte spiegel (handpenvlek) voor op de buitenste twee handpennen (p9 en p10), minder vaak alleen op de buitenste handpen (p10). Meestal scheidt een subterminale zwarte band de witte spiegel van de witte handpenpunt. In tegenstelling tot Arctische meeuwen vertoont *mongolicus* slechts een zwakke kopstreping na de rui naar adult winterkleed. De gele snavel, met een rode gonysvlek,

vertoont een variabele zwarte tekening. De iriskleur varieert van geelachtig wit tot donker grijsbruin en de pootkleur van licht vleeskleurig tot helder oranje.

Mongolicus vertoont duidelijke fenotypische verschillen met Pontische Meeuw *L (c) cachinnans*. De belangrijkste verschillen worden gevormd door de tekening van de vleugelpunt (het aantal handpennen met zwart, de grijze tong en subterminale zwarte band op p10) en de kleur van de ondervleugel (licht grijs bij *mongolicus* en wit bij *cachinnans*). Er bestaan ook duidelijke vocale en genetische verschillen tussen deze twee taxa. *Mongolicus* lijkt nauwer verwant met *vegae* (met inbegrip van *birulai*) en *taimyrensis* alhoewel hij van deze taxa verschilt door de tekening van de vleugelpunt en het winterkleed. Doortrekkende *vegae* en *taimyrensis* verblijven in het voorjaar op het Baikalmeer. Hybridisatie van deze Arctische meeuwen met lokale *mongolicus* lijkt onwaarschijnlijk aangezien deze meeuwen in broedbiologisch opzicht 35-45 dagen 'achterlopen'. De fenotypische, vocale en genetische verschillen van *mongolicus* met *cachinnans* en het feit dat *mongolicus* reproductief geïsoleerd lijkt te zijn van de verwante Arctische taxa *vegae* (met inbegrip van *birulai*) en *taimyrensis* vormen aanwijzigingen dat *mongolicus* als een aparte soort dient te worden opgevat (zowel onder het Fylogenetisch als het Biologisch Soortconcept).

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Madeiran Storm-petrel off Denia, south-eastern Spain, in June 1997

On 30 June 1997 at 16:00, I noticed an unfamiliar storm-petrel *Oceanodroma* close to the shore near the harbour of Denia, Alicante, Spain. It was feeding amongst c 50 European Storm-petrels *Hydrobates pelagicus* and was quite easily picked out by its larger size and foraging behaviour. I could observe the bird for 4-5 min with binoculars and telescope at a distance ranging from 100 to 125 m, and I identified it as a Madeiran Storm-petrel *O castro* (cf Lewington et al 1991, Jonsson 1992).

At first sight, the bird looked like a dark Leach's Storm-petrel *O leucorhoa*, about equal in size, but with a very large white rump patch which extended onto the flanks and undertail-coverts, as in European Storm-petrel. Upon closer look, the tail was only slightly forked, unlike Leach's, and the wingbar on the upperwing was hard to see at a distance of c 125 m. The flight was completely different from either European or Leach's: a direct flight, with the wings held backwards like a small skua *Stercorarius*. It flew in a line parallel to the coast, first from north to south, then it turned after a few 100 m to do it in reverse direction. This feeding flight was repeated at least five times.

In this area, European Storm-petrel breeds on the nearby Balearic isles of Ibiza and Formentera and in the coastal region south of Denia (eg, Islote de Benidorm and Tabarca) (Purroy 1997), and flocks of 30-50 birds were seen daily, feeding close to the pier at Denia from June to August 1997.

This observation has been accepted by the Spanish rarities committee (Eduardo de Juana in litt) and constitutes the third record of Madeiran Storm-petrel for Spain and about the 10th for Europe, and it is the first for the Mediterranean.

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