THE GEESE OF EUROPE & ASIA

S. ALPHERAKY

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Лит. Т-ва И.Н.Кушнеревъ и К° Москва

Geese on Kairan-Kul, Turgai Territory, Sept., 1898 (after Sushkin).

На озерѣ Кайранъ-куль, Тургайской области, въ сентябрѣ 1898 г.

(По акварели съ натуры П. П. Сушкина).

THE GEESE OF EUROPE AND ASIA

BEING THE DESCRIPTION OF MOST OF THE OLD WORLD SPECIES

BY

SERGIUS ALPHÉRAKY

CORRESPONDING MEMBER OF THE ZOOLOGICAL SECTION OF THE IMPERIAL ACADEMY OF SCIENCE, ST. PETERSBURG;
HON. MEMBER OF THE RUSSIAN ENTOMOLOGICAL SOCIETY; MEMBER OF THE IMPERIAL
RUSSIAN GEOGRAPHICAL SOCIETY, ETC., ETC.

WITH

TWENTY-FOUR COLOURED PLATES BY F. W. FROHAWK

F.E.S., M.B.O.U.

AND

FRONTISPIECE BY DR. P. P. SUSHKIN

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"THE JUNGLE," PICCADILLY

MCMV

PREFACE

The present work is a translation of my *Gusi Rossii* published in Russia in 1904.

As all the known species and sub-species of Palæarctic geese are described and figured, I decided to change the title of the English edition to *The Geese of Europe and Asia*.

To many it may seem strange or even improbable that such large, conspicuous, and familiar birds as geese should hitherto have been imperfectly studied and some of the forms confounded with one another, not only by sportsmen, but by many ornithologists; but that this is an indubitable fact is, I think, fully demonstrated in the present volume.

After finishing the description of the geese of the Palæarctic region, I could not help feeling greatly disappointed. Having undertaken the task in the hope that I should be able to give as full information about each separate species as I had furnished for the ducks in my *Utki Rossii*, I became convinced that I had not succeeded in my attempt.

In spite of the comparatively large amount of material which passed through my hands, and despite the diligence with which I studied almost the whole of the sporting and scientific literature concerning these birds, I found so many defects in our knowledge and so many questions left open that I cannot regard the present work otherwise than as preparatory to future investigation, and not as a complete monograph.

Only one work exists dealing with all the geese of the Old World which deserves serious attention, namely, Mr. S. A. Buturlin's *Dikie Gusi Rossiiskoi Imperii*, which appeared in 1901. It was the first attempt, founded on a careful study of the literature, to sift the evidence for each separate form of geese; and this young and gifted ornithologist has shown great skill in his difficult task. Nevertheless, in consequence of too great confidence in the trustworthiness of authors and inadequate material for comparison, Mr. Buturlin arrived at certain conclusions with which I cannot agree, and which are discussed in their proper place, in the present work.

Many of my personal views will no doubt in their turn be disputed by sportsmen and ornithologists, who have not had in their hands so much material as has been in my own. I have therefore entered into great detail—too great, probably, for the majority of readers—in support of my conclusions.

The reader, then, must not be surprised to discover repetitions in the descriptions of the bills of certain kinds of geese, as these were, in my opinion, unavoidable. They of

course make the book heavy reading, but if my main object—clearness—is attained, I trust to escape blame on this score.

While giving almost all the synonyms for each species and race, I considered it unnecessary to quote every reference, especially as this has been already done by Count Salvadori in vol. xxvii. of the British Museum Catalogue of Birds. I have, however, made an exception in the case of Russian writers, both scientific and sporting, since they are far less known in England than they deserve.

My special thanks are due to the following gentlemen for their assistance in preparing the present book :—

Mr. F. W. Frohawk, to whom I owe not only the truthful and masterly drawings of geese and their bills reproduced in the plates, but also numerous notes on specimens in the British Museum and private collections.

Dr. V. Bianchi, Curator of the Ornithological Department of the Zoological Museum of the St. Petersburg Academy of Science. Professor M. A. Menzbier and Dr. P. P. Sushkin, who sent me valuable specimens for examination—the latter having also furnished me with highly interesting MS. notes and given me the water-colour sketch, by himself, representing a scene of goose-life on one of the lakes of the Turgai district, which served as the original to the frontispiece.

Mr. S. A. Buturlin, who has helped me in every way, with material and notes and the MS. extract from his diary kept on the voyage to Kolguev and Novaia Zemlia, which the reader will find at the end of this volume.

Mr. G. F. Göbel, the well-known oölogist, who has kindly placed at my disposal his MS. notes on the eggs of geese, part of which is given as an appendix to the present work.

Professor N. F. Kashchenko, of Tomsk University; the well-known traveller and ornithologist, Mr. N. A. Zarudny; Mr. A. P. Semenov; and Prince V. S. Kochubei, to whom I am indebted for specimens of the highest interest.

And the translator, Mr. John Marshall, M.A., Trinity College, Cambridge.

SERGE ALPHERAKY.

St. Petersburg, *August* 1904.

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Introduction

The geese belong to the order *Chenomorphæ* or *Lamellirostres*, the sub-order *Anseres*, the family *Anatidæ*, and the sub-family *Anserinæ*.

The latter may for our purpose, *i.e.* in order to obtain a good definite idea of the geese of Europe and Asia, be characterised as follows. Size large or medium, exceeding in the majority of cases that of the ducks; neck long, but always shorter than the body; tarsus either equal to, or slightly longer or shorter than, middle toe without claw; toes four, of which the hind one (properly great toe = hallux) is short, and without skinny lobe on lower surface. Ordinarily, in the standing position of the leg, the hind toe touches the ground with the claw, but sometimes it does not, as for example in the black-footed geese. The three anterior digits are connected together by entire webs; the claw of the middle toe is mostly somewhat flattened, *i.e.* flatter than the claws of the remaining toes. The hard bill, covered with soft skin, is stout, the basal portion being thick and deep (always more deep than broad), considerably narrowing towards the point, where, on both mandibles, it terminates in a strong nail with more or less sharply toothed or serrated outer edge, produced by very thickly set transverse parallel furrows and ridges. In a few species (with black feet) the serration of the outer edge of the nail is, however, very feebly expressed. Nail of lower mandible always flatter than that of the upper. The lower mandible is overlapped by the upper, along the edges of which are disposed conical teeth larger and stouter than the teeth on the edges of the former, so that these teeth are always much fewer in number on the upper than on the lower mandible. The teeth referred to are the sharpened ends of transverse horny laminæ, separated by narrow furrows and lying on the inner surface of the mandibles. On the palate of the upper mandible are several longitudinal series of flat papillæ, the outer series of which on each side consists sometimes of somewhat sharp spines bent backwards. The nasal fossæ present elongated ovals, covered with skin, into which, usually near their outer angles, open pervious nasal apertures.

Tongue fleshy, passing at its margins into a horny mass, set with reversed bristles and spines, and tightly closing the furrows, which separate the transverse lamellæ of the mandibles when the beak is shut.

On the under surface of the tip of the tongue lies a very thin horny plate, in shape of a flat nail, the sharp outer edge of which forms a projecting transparent border.[1] Tarsus covered with reticulated skin, consisting of scales for the most part square, to a less extent pentagonal, and more rarely hexagonal. The upper surface of the digits is alone covered with transverse skinny lamellæ or scutes. Oil-gland feathered, as in whole family of *Anatidæ*.

The young are born with their eyes open, are covered with a thick, short down, and are able to run, swim, and feed themselves on the day they are hatched.

[1] At any rate, in those species of geese whose tongues I have had the opportunity of examining.

The ganders are devoid of the osseous or membranous swellings on the larynx peculiar to drakes, as also of a special distinctive breeding dress, so that the plumage in both sexes is of the same colour at all seasons of the year.

There is no coloured speculum across the wing in the geese of Europe and Asia, but on the wrist-joint there is a prominent subcutaneous bony spine or growth, which, however, in no single species belonging to this group develops into a true spur, as is the case in some of the other genera of geese.

Moulting in the geese occurs once a year, and begins immediately after they have hatched their young.[1] The flight-feathers fall out all at one time, as in the ducks and swans, making the birds completely incapable of flight for a time. Birds of the year begin moulting during their first autumn, and, prior to this initial moulting, the feathers of the back and shoulders, as also those of the under surface of the body, are much narrower and more pointed than in adult birds. Apparently, during the first autumn and winter, there occurs among the young birds a slow, gradual change of all the small feathers; but the first shift of the flight-feathers takes place only on reaching the age of one year, *i.e.* at the time when adult birds moult and change their flight-feathers. The plumage in geese never attains its full development earlier than the third year, and in some species probably much later—in the fifth or sixth.

The shafts of the primaries and secondaries in all the Palæarctic geese are invariably white, but they always darken and become of the same colour as the webs in their terminal part. The tail-coverts, both upper and lower, in all these geese are pure white. Geese have from 12 to 18 tail-feathers, and, in rarer cases, as many as 20. Incubation lasts, according to the scanty data yet available, from 25 to 28 days.

Geese pair for life, *i.e.* they are genuine monogamists, and both parents show equal solicitude for their progeny, although the gander does not, as was formerly thought, take part in the brooding. From individual pairs or families of geese (broods) are usually formed considerable flocks, the members of which carry out their wanderings and migrations together.

Owing to their legs being shifted less backward, and, generally, to a greater length of tarsus, geese are far more agile, walk and run more freely, than ducks, swans, or smews (*Mergus*). This is undoubtedly connected with their mode of life, since geese pass much more time on land than on the water.

The voice of the geese is loud, sonorous, and of a different character from that of the ducks, and is very truly expressed by the terms *cackle* or *gaggle*, in contradistinction to the *quack* of the ducks.

The chief food of geese consists of all kinds of plants (especially grasses and water-weeds), their seeds, and sometimes roots; but a few species, living exclusively on the sea-shores, sometimes also feed on small molluscs and other aquatic animals, this being at once betrayed in the taste of their flesh. There is, however, no doubt that the young in down of the geese feed to a considerable degree on animal food—in the shape of various insects, their larvæ, small snails, crustaceans, fish, frog-spawn, etc.

The geese in general enjoy great longevity; it is authentically known, for example, that one American species—*Leucoblepharon canadensis*—lives to a hundred years and more. In France there was lately living a domesticated goose which was 35 years old, and continued till that age to annually lay eggs and hatch her offspring.[2] Certain other species

[1] The males, it is to be noted, begin to moult somewhat sooner than the females.

[2] I have not been able to ascertain whether this goose is still alive.

of wild geese have also lived in captivity from 26 to 30 years, so that, on the whole, there is no ground for scepticism as to their longevity.

In distinguishing geese, as we shall see in the present work, great importance attaches to the structure, dimensions, and colouring of the bill, and also to the colouring of certain unfeathered parts of the body, such as the eyelids and legs. Often among several nearly related species the form, dimensions, and colouring of the bills are almost the sole certain distinctive characteristics; although it must be borne in mind that such characteristics must always be treated with extreme caution and attention, or otherwise it is easy to fall into serious mistakes. I will try to explain this in somewhat greater detail.

In regard to the dimensions of the bills, it must first of all be remembered that geese, as we have already seen, are very long-lived, and at the same time it is absolutely incontestable that with age the bill tends to become continually longer and more massive, so that in very old and large specimens it will considerably exceed in size that of younger, although fully mature, birds of the same species. Once such increase in the dimensions of the bill as a consequence of age is admitted, it is evident that the two or three odd millimetres in excess of the dimensions, which serve as the normal measure for the given species, must not be taken as a sufficient character to assign such exceptional examples to distinct sub-species or races, in the absence of any other more weighty reasons. Such differences in the dimensions will, indeed, only show that the generally accepted standards for the various species have been quoted by ornithologists on the basis of measurements of an insufficient number of individuals, among which, it is quite possible, there did not occur any old or very aged specimens. And, if we refer to collections of skins in various museums, in the majority of cases we shall find the material far from adequate to clear up the question of the normal limits of the size of the bill in all the representatives of each species,—limits the determination of which is extremely desirable. Moreover, for the most part, it is the more youthful and less shy rather than the very old, very wary, and experienced birds that fall into the hands of collectors, so that short-billed specimens are the most common. As a rule, it may be said that skins only in rare cases enable us to judge of the age of geese. All that one can hope for, in examining the majority of collections of skins, is to learn the sex of the bird from the label, and, further, whether the skin belonged to a young or to an adult bird. Sometimes it happens that, among skins of ordinary size (*i.e.* of the dimensions most frequently met with), there occur specimens the measurements of whose bills far exceed the rest; but there is no doubt that such examples are nothing more than large, aged representatives of the same species, which, as already said, fall to the gun of the fowler much more seldom than younger birds. The colouring of the bill also plays a very great part in distinguishing different species, or varieties of one and the same species. But here there is need for still greater caution than when determining geese by the structure of the bill, as it must be remembered that in dry skins the colouring of the soft-parts is subject to considerable changes. Pink, pale or dark flesh-tints alter by fading past recognition, a fact I shall have occasion to speak of in more detail when describing the various species of geese. The intensity in the colouring of rosy bills, as Dr. Sushkin informs me, speaking of the ordinary and lesser white-fronted goose, varies, and, apparently, is connected with the afflux and efflux of blood. Undoubtedly, the same phenomena occur in other species, and particularly in the grey-lag goose.

Apart from this, even a few hours after the death of the bird, some of the delicate hues, as for example rose or light flesh-tints, become for the most part waxy yellow. In the case

of head-wounds, there not unfrequently occur subcutaneous extravasation and infiltration of blood, turning the colouring from light to dark, from rosy to deep crimson, and so on. This I observed more than once in lesser white-fronted geese and swans killed in my presence. Of the latter it happened that 10 to 15 birds were shot in a day, and I noticed that on the following morning the lemon-yellow bills in some specimens (with injured heads) assumed an orange or red tinge; and some such number I had occasion to see and examine not once only but several times, as my fellow-sportsmen and I were then eager in our pursuit of these birds, of which we killed many. I greatly regret that I did not then make coloured sketches of several bills of freshly killed swans; but, unfortunately, I could not then foresee that I should want this information in writing the present book.

Whether food has any influence on the colouring of the soft-parts in geese, is a question which requires careful investigation. Probably the answer should be in the affirmative, and this is the reason, it seems to me, why some English sporting ornithologists affirm that, in the case of pink-footed geese (*Melanonyx brachyrhynchus*) living and breeding in captivity, there have been specimens alike with normally coloured rosy or flesh-tinted soft-parts, and others with these tinged orange, as in the common bean-goose. Sir R. Payne Gallwey even states that he has shot perfectly wild *M. brachyrhynchus* with orange bills and feet, a point I shall discuss more at length in the article on that species.

It thus seems difficult to avoid supposing that such variations in the colours of the soft-parts are dependent on the influence of food. The deposit of subcutaneous fat also must here play no small part, a circumstance I shall discuss in greater detail in the articles on the grey-lag and the white-fronted goose.

Indeed, since we know that certain foods affect the colouring of the plumage in other birds (for instance the familiar fact of the influence of cayenne pepper on canaries), it is quite reasonable to suppose that a certain food may, in no less measure, influence the colouring of the soft-parts of geese. Moreover, it should not be lost sight of that many *Lamellirostres* exhibit purely individual differences in the colouring of both the plumage and the soft-parts, as I have more than once had occasion to state in my *Ducks of Russia* (*vide* articles on Mallard, Teal, etc.).

One other circumstance is very important in connection with the difficulty of arriving at final conclusions in regard to the colouring of the soft-parts in the birds at present under consideration, namely, that all authors by no means define the colours in the same manner.

"De gustibus et coloribus non disputandum," as the saying has it; and it constantly happens that what is considered by one author as yellow, is taken by another for orange, and so on. Therefore, in descriptions of one and the same species, we not seldom meet in different authors very dissimilar determinations of the colours of the soft-parts. I insist specially on this, as I have myself had no little trouble in unravelling the causes of the contradictory descriptions of the soft-parts to be met with in even very careful authors; and I desire to take the opportunity of pointing out the necessity when determining geese, whether freshly killed birds or their dry skins, of being extremely careful in this respect. With this object I asked Mr. Frohawk, who has made the drawings in the present work with such truth to Nature, to direct particular attention to the colouring of the soft-parts, and I can guarantee that the bills in these drawings are presented by the artist in their *normal* colouring with extraordinary exactitude. When I was unable to give precise indications, Mr. Frohawk scrupulously followed the description of the most competent observers, who had noted the colouring from perfectly fresh individuals.

Geese attain the adult colouring of the soft-parts (and also of the plumage) *not earlier* than at the age of 3 or 4 years, perhaps even later. During the first 2 or 3 years, some of the light or bright colours of their soft-parts do not attain that intensity which they do in 5- or 6-year-old birds. It is still more probable that, from the age of 6 to that of 10 years, the colours become yet purer and brighter. Hence it is quite possible that, partly for this reason, we meet with such diversity of description among different authors. It must also be remembered that some species of geese very rarely come into the hands of naturalists in the fresh state (*i.e.* freshly shot), while others never do so.

I consider all this so essential that I shall lay great stress on the colouring of the soft-parts when describing the various species, while it will undoubtedly be necessary to repeat more than once the considerations set forth above, for which I ask the reader's indulgence beforehand.

From immemorial times, the opinion has been held that geese are extremely stupid birds. On the other hand, simultaneously with this unflattering view of their intelligence, all nations from the earliest ages have recognised the extraordinary wariness and watchfulness of these birds. How then are these two conceptions, so absolutely contradictory to one another, to be reconciled? The solution, it seems to me, is to be found in the fact that these opinions refer to perfectly distinct birds, namely, the former to domestic and the latter to wild birds. Indeed, the domestic goose, devoid of all initiative, all independence in the manifestation of its natural capacities, is apparently a thoroughly stupid creature, the more so that its head, with comparatively small eyes, has a far from intelligent expression. Look at a great flock of fat domestic geese, being driven by a boy with a switch in his hand, or by a little girl hardly taller than the birds themselves,—it is difficult to find any symptoms of intelligence in such a flock. But are wild geese like this? On the contrary, they show extreme wariness, acuteness, and curiosity. Their caution is most notable; and there is no game more difficult for the sportsman to approach than geese, excluding of course young and inexperienced birds that have not yet come into contact with their enemies.

Geese breed in uninhabited and usually open situations difficult of access. There they nest, in the majority of cases, in large parties or colonies. Nesting geese may be met with in thousands and tens of thousands in certain extensive water-basins, in the tundras, etc.; but it must not be thought that their nests are crowded, or placed very near together: on the contrary, nesting geese occupy suitable spots in extensive and undisturbed open areas. After being hatched, the young, together with the old birds, while still moulting, gather into large parties and, if necessary, perform their wanderings on foot from one likely spot to another in company. If, however, they meet on the way their most dangerous foe—man, heavy is the penalty the geese have to pay for the encounter. This helplessness of moulting geese has long been known, and in such cases the birds are exterminated *en masse*. Happily, there are not many inhabitants in the chief breeding-grounds, where millions of geese build their nests; otherwise there would be a rapid diminution in the hordes of these birds which rejoice the soul of the fowler and lover of Nature with their appearance and cackle during their spring and autumn flights.

Geese afford one of the most difficult kinds of fowling. However cunning man may be, he finds it extremely difficult to over-reach these wary birds, and in some places one may see them in hundreds of thousands for several weeks at a stretch without the possibility of securing a single specimen. This is especially the case in thickly populated regions, where the geese already know that danger may threaten them.

The flesh of geese in the majority of cases has a good flavour, and only very lean or very old birds have tough and dry flesh. But the same thing happens at times with geese as with ducks, namely, that from certain food their flesh becomes simply nauseous, owing to a peculiar fishy smell. It is probably mainly certain kinds of molluscs which are the cause of this unpleasant odour and taste.

Many tribes of the far north dry the bodies of geese without salt, and regard them prepared in this way as a great delicacy.

The Lamuts consider the raw webs of geese very good eating, as is stated by Baron E. Toll in the *Memoirs of the Imp. Russ. Geogr. Soc.* vol. xxxii. 1897.

Of the different ways of cooking geese, I cannot, unfortunately, say anything, since I have had little opportunity to hear, read, or learn much on the subject.

Explanations.

The measurements of the length of the bill given in this work were made along the culmen (the straight line from the middle of the base of the upper mandible to the end of its nail).

By the expression "greatest depth of lower mandible" must be understood the greatest visible thickness of the latter from the side, with the bill shut tight by pressing together the nails of the mandibles with the fingers.

Soft or naked areas include all the unfeathered parts of the bird, such as bill, inner part of the eyelids, eyes, tarsus, and the feet with their webs. The hind toe, corresponding to the great toe, is sometimes called the hallux.

The sign ♂ denotes the male, the sign ♀ the female.

In the present work I attach very little importance to the measurements given by authors of the tarsus and median digit. This is because, in the majority of cases, I have been unable to establish any constant relation between these dimensions, or between these and the other dimensions of the bird. It is very possible that, in time, with incomparably more material, even these relations between the length of the tarsus and the median digit will afford good distinctive characters, but so far this is not the case.

KEY TO GENERA, SPECIES, AND SUB-SPECIES

1 (42) Feathering of forehead projects into base of bill in the form of an arch or promontory rounded at the end.

2 (31) Feathering of forehead forms a regular arch; legs red, pink, or yellow (in young birds with more or less admixture of grey), but not black. Feathering at sides of neck forms longitudinal tufts, separated by deep furrows. Hind toe in walking touches ground with claw.

3 (6) Whole tail white, in young birds with faint grey tinge. Black streak stretches above edge of upper mandible and below edge of lower from gape. Whole feathering, except black primaries, white (adult bird) or light grey (young birds); legs and bill red (adult) or grey (young birds). Genus **Chen**, Boie (1822).

4 (5) Culmen 50–58 mm. (= 1.96–2.28 in.); wing 370–435 mm. (= 14.50–17.10 in.). *C. hyperboreus*, Pallas.

5 (4) Culmen 63–70 mm. (= 2.48–2.75 in.); wing 440–445 mm. (= 17.30–17.50 in.). *C. nivalis*, Forster.

6 (3) Tail never wholly white; no black streaks along edges of mandibles. White and pale grey are not prevailing tints in plumage.

7 (8) Tail, terminal half white, basal slate-colour. Length of nail on upper mandible contained in total length of culmen considerably less than three times. Outer half or only outer margin of upper nail dark-coloured. Genus **Philacte**, Bannister (1870).

Top and sides of head and back of neck white,[1] in sharp contrast to dark lower part of head and foreneck (adult), or head and neck slate-grey mottled with white (young birds). Bill 35–42 mm. (1.37–1.65 in.); wing 350–400 mm. (= 13.70–15.70 in.). *P. canagica*, Sevastianov.

8 (7) Tail brown, but tail-feathers with white edgings and tips. Length of nail on upper mandible included at least three times in total length of culmen.

9 (30) Neck all round almost uniform grey-brown, only slightly darker behind. White not prevailing colour on head.

10 (15) Whole bill light, from whitish, flesh-coloured, and pink, to orange, with white nail (adult) or grey-fleshy tinge with grey

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[1] Here the white is often coloured with a more or less intense yellow or rusty (sometimes amber-coloured) tinge, as for example in the specimen figured.

or also brown nail (young birds). On belly of adults a greater or less number of transverse brown or black patches (sometimes confluent or even covering greater part of belly). Genus **Anser**, Brisson (1760).

11 (12) Length of culmen not less than 60 mm. (= 2.36 in.); rump and margin of wing pale ashen grey. Legs flesh or roseate without orange tint. Culmen[1] 61–72 mm. (= 2.40–2.83 in.); wing 400–500 mm. (= 15.70–19.60 in.). *A. anser*, Linnæus.

12 (11) Culmen less than 60 mm. (= 2.36 in.)[2]; rump dark slaty brown; legs orange or yellow, rarely with roseate tinge; edge of wing dark brownish grey. Around base of upper mandible lies a broad white band (adult) or narrow black margin, in which are sometimes scattered separate white featherlets (young birds).

13 (14) Culmen not less than 40 mm. (= 1.57 in.). When bill is shut, almost all teeth of upper mandible visible from without. Around eye absence of well-marked yellow ring, formed by ceroma. In adult, white spot on forehead does not go farther back than line joining anterior angles of eyes, while usually falling far short of the same.

Culmen 40–56 mm. (= 1.57–2.20 in.); wing 375–435 mm. (= 14.70–17.10 in.). Length of nail on upper mandible included more than three times in total length of culmen. *A. albifrons*, Scopoli.

14 (13) Culmen less than 38 mm. (= 1.49 in.). When bill is shut, teeth of upper mandible not visible from without or noticeable only near gape.[3] Ceroma forms somewhat swollen yellow ring around eyes. In adult, white space projects backward over forehead considerably beyond line joining anterior angles of eyes, but rarely reaches line joining their posterior angles.

Culmen 29–37½ mm. (= 1.40–1.47 in.); wing 345–395 mm. (= 12.60–15.50 in.). Length of nail on upper mandible included three times in total length of culmen. *A. finmarchicus*, Gunner.

15 (10) Basal half of upper mandible or parts of it, culmen and nails of both mandibles, always black; light parts of bill yellow (to orange inclusive) or pink to dark flesh or reddish. In young birds, black colouring on bill always prevails over light. Never any black patches on the belly. Genus **Melanonyx**, Buturlin (1901).

16 (29) Colouring of light parts of bill and legs identical.

17 (20) Light parts of bill and leg pink or flesh coloured.

18 (19) Margin of wing dark grey-brown; culmen 55–63 mm. (= 2.16–2.48 in.); wing 450–488 mm. (= 17.70–19.20 in.). *M. neglectus*, Sushkin.

19 (18) Margin of wing bluish ashen grey; culmen 42–48 mm. (1.65–1.88 in.); wing about 400 mm. (= 15.70 in.) (from lack of material, I cannot give more definite limits for the variation in the length of the wing). *M. brachyrhynchus*, Baillon.

20 (17) Ordinarily, light parts on bill and leg yellow or orange-yellow

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[1] Sometimes, as stated by undoubted authorities, the bill in this species is also orange-coloured, which in such case must certainly be dependent on a considerable layer of subcutaneous fat, whereof I shall have occasion to speak in greater detail when describing this species.

[2] Personally I have not happened to see an example with a bill longer than 56 mm. (2.20 in.), but among American specimens, distinguished by the name *A. albifrons gambeli*, bills sometimes occur with culmen reaching 60 mm. (2.36 in.).

[3] However, in dry skins, in which the skin at the edges of the upper mandible has become somewhat raised or warped in the process of drying, the teeth are visible from without, but this is an abnormal phenomenon.

(adult), but, apparently as an exception, this colour sometimes assumes on bill a red tinge.

21 (24) Length of nail on upper mandible included in total length of culmen more than four times in fully adult birds, or four times in younger specimens.

22 (23) Culmen 55–72 mm. (= 2.16–2.83 in.); greatest depth (thickness) of visible portion of lower mandible, with bill shut, 6–8½ mm. (= .23–.33 in.). Prevailing colour on bill (in adults) yellow (or orange), in young birds black.

Around base of upper mandible on feathering lies a white band, absent only in young and very old individuals. *M. arvensis*, Brehm.

23 (22) Culmen 74–83 mm. (= 2.91–3.26 in.); greatest depth (thickness) of visible portion of lower mandible, with bill shut, 9–12 mm. (= .35–.47 in.). Yellow (orange) colouring concentrated on terminal portion of bill in form of ring embracing both mandibles.

Around base of upper mandible no white feathering. *M. arvensis sibiricus*, Alphéraky.

24 (21) Length of nail of upper mandible included in total length of culmen considerably less than four times.

25 (28) Yellow (orange) colouring concentrated on anterior half of bill; no white feathering along base of upper mandible; sometimes white patch occurs on chin, or even whole chin is white.

26 (27) Culmen 48–61 mm. (= 1.88–2.40 in.); greatest depth of lower mandible, with shut bill, 7½–11 mm. (= .29–.43 in.); wing 425–450 mm. (= 16.70–17.70 in.). *M. segetum*, Gmelin.

27 (26) Culmen 62–72 mm. (= 2.44–2.83 in.); greatest depth (thickness) of lower mandible, visible with shut bill, 10–12 mm. (= .39–.47 in.); wing 450–475 mm. (= 17.7–18.7 in.). *M. segetum serrirostris*, Swinhoe.

28 (25) Yellow colouring extends from terminal portion of bill under nares and along edge of upper mandible in irregular patches. Length of bill 68–78 mm. (= 2.67–2.95 in.); greatest depth of lower mandible, with bill shut, 13–16 mm. (= .51–.63 in.). Wing 495–516 mm. (= 19.40–20.30 in.). *M. segetum mentalis*, Oates.[1]

29 (16) Colouring of light portions of bill and legs unlike; on bill, pink (red?), on legs, orange. Culmen 64 mm. (= 2.51 in.). (Doubtful species.) *M. ? carneirostris*, Buturlin (*species dubia*).

30 (9) Prevailing colouring of head white. Along each side of dark neck stretches a broad white band. Bill weak, entirely light except black nails, of which upper included in total length of culmen not less than four times. Genus **Eulabeia**, Reichenbach (1852).

Prevailing colour of head white, with two black transverse bars, anterior one of which reaches to eyes (adult birds), or with dark brown occiput and nape (young birds). General colouring ochreous light grey; rump bluish cinereous grey.

Culmen 48½–58½ mm. (= 1.9–2.4 in.). *E. indica*, Latham.

31 (2) Feathering of forehead projects into base of bill in an abrupt arc or promontory. Legs at all ages black (of varying intensity); bill entirely black. Feathering at sides of neck forms scarcely any sharply defined longitudinal tufts, or latter feebly expressed.

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[1] I now no longer doubt that the *A. mentalis* described by Oates is founded on very large old specimens of the eastern variety of the bean-goose.

Claw of posterior digit (hallux) does not touch ground in walking.

32 (33) Whole (or almost whole) of chin feathered. Bill very small, with very convex nail on upper mandible. Teeth not visible with bill shut. Tail in adult black; in young birds, with narrow white tips to the feathers.

Colouring consists of following tints: black, rufous, and white.

Genus **Rufibrenta**, Bonaparte (1856).

Foreneck, upper breast, and aural region of a rufous chestnut colour, and bordered with white and, in places (on the breast), black stripes (adult), or foreneck and upper breast rufescent, and aural region with black and white mottling (young birds); across blackish wing, at ends of greater coverts, two white or whitish belts.

Culmen 23–25 mm. (=.90–.98 in.); wing 350–360 mm. (=13.17–14.10 in.). *R. ruficollis*, Pallas.

33 (32) Upper half of chin not feathered. No chestnut or rufous colouring in feathering; breast black.

34 (39) Whole head black. Upper and lower tail-coverts always white, and reach tip of tail-feathers. Genus **Branta**, Scopoli (1769).

35 (38) In adults, a white patch on each side of neck, consisting of white streaks, in young birds either wanting or only traces. Now and then, in adults, these spots touch in front.

36 (37) Belly slate-grey; culmen 30–38 mm. (=1.20–1.50 in.); wing 312–345 mm. (=12.30–13.60 in.). *B. bernicla*, Linnæus.

37 (36) Belly pearly greyish or ochreous white. Otherwise as in type form. *B. bernicla glaucogaster*, Brehm.

38 (35) In adults, white patches on neck always widely separated on front, and often on hind surface of neck. In young birds, this collar either absent or feebly developed. Whole feathering of adults darker, and belly as black as breast. Dimensions as in last. *B. bernicla nigricans*, Lawrence.

39 (34) Upper and under tail-coverts do not reach tips of tail-feathers. Head partly white.

40 (41) Neck long; forehead black. On black head, only hind part of cheeks and aural region white. These spots often confluent on throat, but sometimes perfectly distinct.[1] On feathering of body and wings no sub-terminal black spots. Genus **Leucoblepharon**, Baird (1858).

Bill $30\frac{1}{2}$–$48\frac{1}{2}$ mm. (=1.20–1.90 in.); wing 373–449 mm. (=14.75–17.75 in.). *L. hutchinsi*, Rich. & Swains.

41 (40) Neck short; forehead, with exception of black streak at base of upper mandible, white. On feathers of back, scapulars, and wing-coverts sub-terminal black crescentic stripes (adults), or wide black bands (young birds). Genus **Leucopareia**, Reichenbach (1852).

Greater part of head white; lores, occiput, nape of neck, and streak at base of upper mandible on top of forehead—black. General colouring of body pale ashen grey.

Culmen 28–36.3 mm. (=1.10–1.43 in.); wing 378–429 mm. (=14.90–16.80 in.). *L. leucopsis*, Bechstein.

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[1] I suspect that this depends on the age of the birds, but I have no data to decide this question.

42 (1) Feathering of forehead does not project into base of upper mandible. Base of upper mandible slightly swollen and wrinkled. Huge bill wholly black. Tarsus considerably shorter than middle toe without claw; feet orange. — Genus **Cygnopsis**, Brandt (1836).

Over back of neck stretches coffee-brown bar. Foreneck whitish. Along base of upper mandible runs narrow white stripe, often with strong rusty tinge (adults); in young birds, only traces of this white stripe, and bill much shorter.

Bill along culmen (adults) 75–100 mm. (= 2.95–3.93 in.); wing 405–470 mm. (= 15.90–18.50 in.). — *C. cygnoides*, Linnæus.

In using this Key the reader must understand that cross-references are the essential feature. For instance, when studying No. 1 (42) he must refer for comparison to No. 42 (1). In this instance he will find that in No. 1 *the frontal angle* forms an arch, etc.; but on turning to No. 42 (1), it will be seen that the frontal angle does not form an arch. Again, taking No. 2 (31), it will be seen that the feet are of different colours, but *never black*; while under No. 31 (2), it will be seen that the feet are always black.

Genus *Chen*, Boie (1822)

WHOLE tail white or with feeble greyish tint (in young birds). Adult pure white, except black primaries; plumage of young birds light grey. Along each edge of lower and upper mandibles a black stripe. Legs and bill red in adult, and grey in young.

THE SNOW-GOOSE

CHEN HYPERBOREUS, PALLAS

Plate 1

English.—*Snow-Goose*; Amer.—*White Brant*; *White Brand* (Carolina); *Wavey*; *Wae-Wae*; *Wevoi*; *Mexican Goose*; *Red Goose* (Wilson); *Fish Brant*; *Texas Goose.*
Russian—*Bely gus*; *snezhny gus*; *polyarny* and *severny gus* (Vavilov); *maly bely gus* (Buturlin).
Tatar—*Kuba-gaz* (on Caspian).[1]
Yakut—*Yurgun-kàz* (white goose).
Ostyak (Berezovst)—*Ungula-khoteng* (*teste* Pallas, "dumb swan").
Lamut—*Giltàli.*
Samoyed—*Yuraki-Varàkh.*
Kamchadal—*Khynkà.*
Uka—*Kèishuash* (Kamchatka).
Japanese—*Hakugan.*
French.—*Chen hyperboré*; *Oie des Esquimaux*; *Oie de neige.*
German.—*Schnee Gans*; *Weisse Gans*; *Nord-gans*; *Polar Gans.*

Anser hyperboreus, Pallas, Spic. Zool., vi. p. 25 (1767); *id.*, Zoogr. Ross.-As., ii. p. 227, pl. 65 (1811); Kessler, Russk. Orn., p. 372 (1848); Menzbier, Pt. Ross., i. p. 722 (1895); *id.*, Prom. Pt. Ross. i Kavk., p. 459, pl. 129 (1902); Buturlin, Tabl. Opr. Plast. ("Psov. i Ruzh. Okh.," 1900); *id.*, separ., pp. 5 and 6; *id.*, Dikie Gusi Rossiisk. Imp. ("Psov. i Ruzh. Okh.," 1901, Feb., Ap.); *id.*, separ., p. 9; *id.*, Sinopt. tabl. Okh. Pt. Ross. Imp., p. 42 (1901); Yablonsky, "Prir. i Okh.," 1891 (vii.), p. 58 (Minus. Yenis. g.); Radde, Ornis Cauc., p. 446 (1884); Buturlin, "Prir. i Okh.," 1896 (Feb., Mar.); *id.*, "Psov. i Ruzh. Okh.," 1899 (Nov.); Menzbier, "Prir. i Okh.," 1898 (Aug.); Sabancyev, Bull. Soc. Mosc. 1871, ii.; *id.*, "Zhurn. Imp. Obshch. Okh.," 1874 (vii.), p. 14; *id.*, Ukaz. Kn. i St. Okh. i Zool. Çod., p. 455 (1883); Seebohm, Ibis, 1844, p. 32 (Japan); Palmen, Bidr. Sibirisk Ishafsk. Fogelf. Véga Exp., p. 417; Finsch, Verh. z.-b. Ges. Wien, 1879, s. 260; Collett, Ornith. Jahrb., 1890, i. p. 37.
Anas hyperboreus, Sevast., in note to p. 474 "Opisanie Kamchatki," Krasheninnikov (1818).

[1] Dr. G. T. Radde explains the name *Kuba-gaz*, given to this goose near Leukoran, by the fact that it migrates thither from the north, in the direction from Kuba, lying to the north of Leukoran.

Anas hyperborea, Gmelin, Syst. Nat., ii. p. 504 (1788).
Chen hyberborea, Boie, Isis, 1822, p. 563; Taczanowski, Faune Orn. Sib. Or., p. 1086 (1893); Ridgway, Man. N. Am. Birds, p. 115 (1887); Stejneger, Orn. Expl. Comm. Isl. and Kamtsch., p. 317 (1885).
Chen hyperboreus, Bonaparte, Comp. List, p. 55 (1838); Zarndny, Orn. F. Orenb. kr., p. 225 (1888); *id.*, Dopoln. k Orn. F. Orenb. kr., p. 107 (1897); Collett, Orn. Jahrb., i. p. 137 (1830); Stejneger, Bull. U.S. Nat. Mus., x. No. 19, p. 317 (1885); *id.*, Proc. U.S. Nat. Mus., x. p. 135 (1887) (Bering Isl.); Baird and Ridgway, Water-Birds N. Am., i. p. 430 (*partim*) (1864); Salvadori, Cat. Birds Brit. Mus., xxvii. p. 84 (1895); Macpherson, History of Fowling, 1897, p. 218.
Chionochen hyperboreus, Reichenbach, Av. Syst. Nat., p. ix. (1851).
Chenalopex hyperboreus, Lichtenstein, Nomencl. Av., p. 101 (1854).
Anser albatus, Cass., Proc. Ac. Philad., 1856, p. 41.
Chen albatus, Elliot, New and Unfig. Birds N. Am., ii. pl. 42 (1867).
Anser hyperboreus, var. *albatus*, Coues, Key N. Am. Birds, p. 282, No. 486, *a* (1872).
Chen hyperboreus albatus, Ridgway, Proc. U.S. Nat. Mus., 1880, p. 202.
? Maly lebed, Dombrowski, "Okhot. Gaz.," 1897, p. 228 (Bukhta Salmonchu Tatarskago proliva).
?? Cygnus (*Coscoroba*) *davidi*, Swinhoe, Proc. Zool. Soc. L., 1870, p. 430.
?? Cygnus davidi, Swinhoe, Proc. Zool. Soc. L., 1871, p. 416 (*non Cygnus davidi*, Gigl. & Salv., Proc. Zool. Soc. L., 1887, p. 589, pl. lii. = *Cygn. bewicki*).

Adult Birds of Both Sexes

Whole plumage, with exception of primaries, their coverts and bastard wing, snowy white; the head only has often a rusty tinge of varying intensity, such as is commonly met with in many aquatic birds. Primary wing-feathers black (except white shafts, gradually passing into greyish towards the base of the feathers); their coverts, as also alula, of a pale ashen grey (hoary). Under side of wings and axillaries white. Bill, with very concave arched edges of upper mandible, lilac red or dark red with whitish or yellowish nails; but sometimes the bill is yellowish pink, passing on nasal fossa, around nares, into bright red; lower mandible usually somewhat lighter and more lilac-coloured than upper. Above the edge of upper and under edge of lower mandible, from gape to tip, run coal-black stripes, attaining their greatest width in the middle. These black stripes give the bill a sneering expression, and are, in my opinion, so characteristic of representatives of the genus *Chen* that their absence alone, were there even no other distinctive characters, would be perfectly sufficient to justify the removal from this genus of the species *rossi*, for which Mr. Elliot in 1868 established the genus *Hexanthemops*.

Feet lilac or orange-red, with black claws; soles either dingy yellowish or pale yellow. Iris dark brown. Eyelids sometimes dark red, sometimes pale greenish. The female, as in all geese, is somewhat smaller and more slender than the male.

In the vast majority of cases 16 tail-feathers, but rarely 18.

Total length	23–29 in. (= 584–736 mm.)
Wing	14.5–17 in. (= 368–431 mm.)
Culmen	1.95–3.3 in. (= 49.5–58.4 mm.)
Tarsus	2.8–3.25 in. (= 71.1–82.5 mm.)

Weight apparently never exceeding 6, and usually somewhat less than 5 Russian lbs.

Young Birds

Top of head, hind neck, and upper surface of body pale greyish, feathers of back with lighter edges. Upper wing-coverts and tertiaries dark grey with broad white edgings; secondaries with grey mottlings, bordered with white. Primaries black, passing towards base

into greyish; their coverts and winglet light ashen grey. Under side of wing and axillaries greyish white. Rump, upper and lower tail-coverts, and whole under side of body, pure white; breast and tail white with greyish tint. On head, usually a rusty tinge, thickest on the fore part. Bill and feet dark grey or brownish, often with greenish or olive tint. Black stripes along edges of mandibles as in adult birds.

The young birds take not less than four years to gain the adult plumage (although it is stated that this sometimes occupies a still longer period), the birds gradually whitening with each moult.

In regard to the young in down there is a lack of information.

I therefore pass on to discuss the question as to what species or what form of snow-goose—whether the *Anser hyperboreus* of Pallas, or the larger *Chen nivalis* of Forster—occurs in North-Eastern Europe, especially Russia. To decide this is at present not only difficult but impossible, since apparently not a single specimen of snow-goose killed in Russia exists in any museum.

Consequently there is no possibility of deciding this question, and one is compelled, *nolens volens*, to content oneself with conjectures and conclusions, which may be proved erroneous by the first specimens which come into the hands of naturalists. From the statement that in Japan both forms occur, *i.e.* the lesser and greater (*Chen hyperboreus* and *nivalis*), the conclusion might be drawn that both are met with also in Eastern Europe, but the very occurrence of both these geese in Japan must, for the present, be accepted with caution.

The sole specimen from Yokohama (killed March 5, 1882), preserved in the Zoological Museum at St. Petersburg, belongs to *Chen hyperboreus*.

Total length	28.50 in. (=725 mm.)
Wing	16.7 in. (=425 mm.)
Culmen	1.96 in. (=50 mm.)
Tarsus	2.55 in. (=65 mm.)

Further, it must be borne in mind that the specific distinctness of these two geese is apparently still far from being finally settled. For instance, such a well-known sportsman as Mr. Leffingwell,[1] in his article on geese (*Shooting on Upland, Marsh, and Stream*, Chicago, 1890, p. 314), writes that the great and small snow-geese gradually pass into each other by an uninterrupted series of forms which are very confusing; in other words, it is often difficult to know to which of these forms to refer specimens. The surmise, expressed by Mr. Buturlin, that it is *Chen nivalis*, and not *C. hyperboreus*, which occurs in Russia, is founded only on the apparently greater size of specimens noted by the few sportsmen who have chanced to see snow-geese in Russia, and consequently is based chiefly on probability.

Even this apparent probability, in my opinion, is considerably shaken by the following considerations.

It must, firstly, be remembered that all white birds[2] seen during flight appear larger than birds of the same size but of a dark colour.

Further, although *Chen nivalis*[3] is considerably bigger than *Chen hyperboreus*, this

[1] Author of several works on the water-fowl of North America.

[2] And in general all white objects in Nature.

[3] This we shall see farther on, when I give the dimensions and certain data on this form.

difference is scarcely sufficient to enable observers to recognise the bird on the wing, and particularly in the case of birds flying like geese, *i.e.* at a considerable distance from the observer.

Again, the geographical distribution of snow-geese in North America, so far as ascertained, is to a certain extent against Mr. Buturlin's supposition. Thus, it is known that in the western part of North America only the lesser snow-goose, *i.e. Chen hyperboreus*, is found, while on the eastern side we have *Chen nivalis*. Accordingly, in order that *Chen nivalis* should be the bird which has been observed in Russia, as *e.g.* in the Governments of Kiev, Orenburg, and on the Caspian, it must be assumed either that East American birds migrate thither, or that *Chen nivalis* breeds in some part of Siberia. In the latter case, there would be the remarkable circumstance that the distribution of the form breeding in Siberia and in Eastern America is interrupted in Western America and replaced by another form, namely, the lesser snow-goose. This would be a distributional feature without parallel in the animal world of the Northern Hemisphere.

I think, therefore, that Mr. Buturlin's supposition is hardly probable, although, in the absence of full information, it cannot be definitely contradicted. Accordingly, for the present, we must retain for the snow-goose of Russia the name *hyperboreus*, given by Pallas, and accepted by all ornithologists.

Geographical Distribution

We have only the following scanty information with regard to the geographical distribution of the snow-goose in Eastern Europe, and this information is of such a kind that it is impossible to give it full reliance. Pallas says: "Together with the black brant, it appears in spring in large numbers in the valley of the Lena, whence on the melting of the ice it probably proceeds to Polar lands not yet explored." According to the same authority, these birds are very abundant around the Yana, so much so that men and dogs feed on them the whole winter. "More rarely," he continues, "they occur near the Kolyma and along the Indigirka. They are very rare in Kamchatka along the Yurak shore and at the mouths of the Obi, where, as well as on Taimyr, they are met with on the promontories of the continent extending into the Arctic Ocean."

Evidently Pallas wrote this mainly from hearsay; but there is no doubt that, from the Lena on the east, along the shores of the Arctic Ocean and on the adjacent islands, the snow-goose is to be met with. According to Krasheninnikov, in Kamchatka "the snow-goose is especially rare. On the contrary, in the Northern Sea, about the Kolyma and other rivers, there are so many that the hunters kill a vast number, on which account the very best down is brought to Irkutsk from those places. The geese are caught when they are moulting, in a somewhat curious manner. In the spots to which the geese most resort are built huts with open doors. In the evening the hunter puts on a white shirt or shuba, and having stolen upon the flock, shows himself, and then creeps into the hut, upon which all the geese follow, and enter the hut, while the hunter, having passed through, closes the other door and, running to the other side, kills all the geese in the hut."

Personally, I am of the opinion that snow-geese breed in Arctic Eastern Siberia and on the adjacent islands in considerable numbers, and that they migrate thence mainly to the Pacific shore to winter, and that only an insignificant proportion migrates westward; the latter contingent being the source of those occasional snow-geese met with here and there

in European Russia and farther west in various parts of Europe, and the birds regularly passing the winter on the Caspian.

That subsequent travellers in Siberia have not confirmed the statements of Pallas and Krasheninnikov is absolutely of no importance. It is quite recently, for instance, that Fischer's eider-duck has been found breeding at the mouth of the Yana, and *Œdemia stejnegeri* nesting constantly in the Altai. Besides this, it must not be forgotten that this goose, as we have seen at the beginning of this article, has native names, which undoubtedly points to an intimate acquaintance with these birds on the part of the natives, who generally do not give names to rare and little-known animals.

Unfortunately, we must confine ourselves to hypotheses respecting the distribution of the snow-goose in Eastern Europe, and it only remains to add that, according to report, it is frequently seen as a bird of passage on the middle Volga, as stated by Mr. Buturlin.

Dr. G. T. Radde, in his *Ornis Caucasica*, says that in severe[1] winters, among great masses of various geese wintering in the Kizil-Agach Gulf, small flocks of snow-geese are met with, which are very vigilant, and are known to all local hunters as white geese with black primaries and secondaries. Nine of these geese were observed on February 28 (March 11), 1880, at the Burani Islands, but on March 5–17, when Dr. Radde was there, they had already left.

As regards these geese visiting Western Europe, there is no lack of data, although of course they have been more often seen than caught, a usual circumstance in connection with wild geese of all species. If most or all have hitherto been noticed in Great Britain, this evidently is in consequence of the greater number of persons interested in zoology, and the greater number of wild-fowlers. Judging by the snow-geese hitherto taken in England and Ireland, they all belonged to the lesser form, *i.e. Chen hyperboreus*, and not to the greater, *Chen nivalis*; from this it is clear that they could not have arrived from the eastern part of North America, where only the larger form is found, but from other regions, probably the northern part of the Palæarctic region, but the precise locality the future alone can make clear.

In other parts of Western Europe snow-geese have also been observed comparatively often. They have been observed, for instance, in Germany (as noticed by Naumann); in Norway, where, according to Dr. Collett,[2] a female was taken in 1889 in Lesterland, not far from Lindesnäs, in the southern point of Norway, where, on September 24, 1889, four birds settled, of which one was killed and given to the Christiania Museum. This was an old female; the three remaining birds lingered for some days.

It is affirmed that these geese have been more than once noticed in the Greek Archipelago, and probably they will be found wintering in the Black Sea, when that sea shall be visited by systematic zoologists. As to the cases occasionally mentioned of the appearance of snow-geese among flocks of bean-geese, or that, during the flight of flocks of the latter, snow-geese were seen leading them, such identifications are mere guess-work and devoid of certainty. Different species of geese in general keep apart from others, and to suppose that one species should lead individuals belonging to another, is to me personally more than doubtful. Albinos, however, undoubtedly occur among geese; and it seems more simple to explain these instances by the suggestion that albino bean-geese,

[1] It may, however, be assumed as almost certain not only in severe but in all winters.

[2] *Ornithologisches Jahrbuch*, 1890, i. p. 37.

flying at the head of the flock, have been taken for snow-geese. Albinism, as is well known, is a pathological or abnormal phenomenon, which apparently may occur in birds from their very hatching (sometimes, after several moultings, it happens that albinism disappears, in consequence of the removal of the inducing cause), or in the prime of life, or, finally, in old age. I suggest, then, that in such cases old birds, which have for many years led the flock, having from some cause contracted albinism, still continue to guide the flock in their new dress. Of course, all this is only hypothesis, but the same is true also of the identification of the snow-goose in such white specimens.

Somewhat more exact data as to the geographical distribution of this species and the form *Chen nivalis* have been obtained in regard to North America. Thus *Chen hyperboreus* is met with over the whole of the western half of North America, and breeds, besides, on the Arctic western shore, also in Alaska, descending in winter through the whole country lying between the Pacific Ocean and the valley of the Mississippi. It abounds from Alaska and the Washington district to South Carolina; and reappears in great numbers in the middle and western parts of California in winter, keeping chiefly to the fens and plains situated near the sea, or occurring on the sandy shoals and spits projecting into the latter. Here the birds arrive from the north in October, and stay till March, when, simultaneously with other geese, they again take wing to the north. That the snow-geese appearing in winter in Japan are natives of North America I strongly doubt, since it is practically certain that birds come there from Northern Asia to spend the winter.

An astonishing fact, it seems to me, is the migration of this goose to the island of Maui, as mentioned by the Hon. Walter Rothschild in his *Avifauna of Layzan.*

The above, then, are the general limits within which the snow-goose has been hitherto found.

The food of the snow-goose, at least in winter, consists apparently almost exclusively of vegetables, such as shoots of various grasses, reeds, etc.; but it is very probable that the young birds vary their diet with insects and molluscs, as is the case with the majority of other species of geese. In summer, however, they gladly devour berries.

In general, undisturbed birds of this species are fairly tame, but they quickly recognise danger, and then become as unapproachable as the majority of other geese. According to the evidence of some observers (such as Pallas), these geese are rather silent, but sometimes during flight they utter a sharp cry, like *Khouk*, although they do not call continuously like the brants. Despite their wariness, man has succeeded in outwitting them, as they readily enter decoys of members of their own species, paying for their folly with their lives in large numbers. It is said that in North America their salted carcasses are kept by the natives some two years, and are then considered good eating.

Their summer food, according to Sir John Richardson, is mainly composed of cane-shoots and insects, in autumn of the berries of *Empetrum nigrum.*

The eggs of this goose are of a regular oval form, and white. Their length is about 3 in. (=76 mm.), and the transverse diameter 2 in. (=51 mm.).[1] The number of eggs in a

[1] According to a communication by Mr. G. F. Göbel, an egg of a snow-goose, in the Zoological Museum at St. Petersburg, has the following measurements—

Breadth, 52.5 mm. (=2.06 in.)
Length, 89.5 ,, (=3.52 in.)

This is very probably an egg of *Chen nivalis.*

In regard to the structure of the egg, this zoologist says: "The grain of the shell resembles that of the white-fronted goose, but the elevations are more conspicuous and less close, so that there is room for dirt to lodge in the interstices, as is seen in the specimen above mentioned. Mr. Göbel does not indicate its origin."

clutch is rarely large, but I have nowhere succeeded in finding exact data on this point. In August the young birds become fledged, and somewhat later the old ones finish moulting, so that by the beginning of September the majority are already capable of moving south, although belated broods sometimes remain in their hatching-grounds until October.

Very interesting are the details of a case of crossing a gander of this species, taken in England, with a common domestic goose, from which goslings were reared. These details were given by Mr. J. E. Harting in the *Zoologist* for 1878 and 1881.

GREATER SNOW-GOOSE

Chen nivalis, Forster

Bolshoi bely gus (Buturlin); *bolshoi polyarny gus* (Buturlin).

Note.—If it should prove that both this snow-goose and the lesser species occur in Russia, probably some of the native names, cited for the latter, would refer also to the present species.

English.—*Greater Snow Goose.*

Anas nivalis, Forster, Phil. Trans., lxii. p. 413 (1771) (Hudson's Bay).
Anas hyperborea, Gmelin, Syst. Nat., ii. p. 504, p. 54 (*partim*) (1785).
Anser hyperboreus, Bonnaterre, Enc. Méth., i. p. 111 (1790); Pallas, Zoogr. Ross.-As., ii. p. 227 (*partim*) (resp. Fret. Huds.) (1811); Audubon, Orn. Biogr., iv. p. 562, pl. 381 (1838); Buturlin, Dikie Gusi R. I. Zhurn. "Psov. i Ruzh. Okh.," 1901; *id.*, separ., p. 10; *id.*, Tabl. Opr. Plastinchatokl. "Psov. i Ruzh. Okh.," 1900; *id.*, separ., pp. 5 and 6; Menzbier, Pt. Ross., i. p. 723 (1895).
Chen hyperboreus, Gray, Hand-List of Birds, iii. p. 75, No. 10570 (1871); Baird and Ridgway, Water Birds of N. America, i. p. 439 (*partim*), 1884.
Chen hyperboreus nivalis, Ridgway, Proc. Biol. Soc. Wash., ii. p. 107 (1884); Baird and Ridgway, *op. cit.*, ii. p. 440 (1884).
Anser hyperboreus nivalis, Seebohm, Hist. Brit. Birds, iii. p. 490 (1885); Buturlin, Sinopt. tabl. Okh. Pt. R. I., 1901, pp. 41 and 42.
Chen hyperborea nivalis, Ridgway, Man. N. American Birds, p. 115 (1887).

Adult and Young Birds

These are not distinguished from the preceding species in plumage and colour, but merely differ in dimensions, which considerably exceed those of *Chen hyperboreus*.

Total length	30–38 in. (= 762–965 mm.).
Wing	17.35–17.50 in. (= 44–44½ mm.).
Culmen	2.55–2.70 in. (= 65–69 mm.).
Tarsus	3.15–3.50 in. (= 80–89 mm.).
Median digit	2.60–2.80 in. (= 66–71 mm.).

Although these dimensions are given by different authors, it must be supposed, according to the views of Mr. Leffingwell,[1] that specimens exist of smaller dimensions,

[1] *Shooting on Upland, Marsh, and Stream*, Chicago, 1890, p. 314.

standing between *C. hyperboreus* and *C. nivalis*. Unfortunately this author does not give more detailed data or measurements of such intermediate individuals.

Geographical Distribution

Approximately the whole of Northern Arctic America to the east of the Mackenzie River is the breeding-ground of this form, which in winter and during migration occurs in the United States from the east of the Mississippi to the Atlantic Ocean. There is, however, no occasion in this work to enter into greater detail concerning its distribution.

Genus *Philacte*, Bannister (1870)

BILL comparatively short, very square and stout, with feebly curved edges and very large nail on upper mandible, which occupies nearly the whole apical third of latter. Nasal fossæ wide and rounded, their posterior edges approaching very near to feathering of lores in adults, and confluent with the same in young birds; nasal apertures not large, but of rounded form,—their anterior edge falling somewhat short of the middle of the bill; tarsus shorter than median digit. Soft-parts light-coloured. Outer half of upper nail of bill (in younger birds) or only its outer edge (full-grown) dark horn-brown colour.[1]

THE EMPEROR-GOOSE

PHILACTE CANAGICA, SEVASTIANOV

Plate 2

English—*Emperor-Goose*; *Painted Goose*; *White-headed Goose.*
Russian—*Kurilski gus* (Kamchatka,—Vozvesensky); *beloshei* (Kamchatka,—Krasheninnikov); *goluboi gus* (Buturlin); *imperatorski gus* (Menzbier); *tsarski gus* (Smirnov).
Aleut—*Kamkhàng.*
Eskimos—*Khud-yar-lik* (=cap goose); *makhòutiluk.*
French—*Bernache canagica* (Degl. and Gerbe).

Anas canagica, Sevastianov, Nov. Act. Ac. St.-Pét., xiii. p. 346, pl. x. (1800).
Anas canadicus (errore), Sevastianov, in Opisanie Kamchatki, Krasheninnikov, ii. p. 473 (notes) (1818).
Anser pictus, Pall., Zoogr. Ross.-As., ii. p. 233, pl. 67 (1811); Nordensk., Voy. of the Vega, ii. p. 42 (1881); Smirnov, "Okhotn. Gaz.," 1900, p. 294.
Anser canagicus, Brandt, Bull. Ac. Sc., S.-Pét., i. p. 37 (1836); *id.*, Descr. et Icones An. Ross., i. p. 7, pl. i. (1836); Buturlin, Dikie Gusi R. I. ("Psov. i Ruzh. Okh.," Feb.-Apr. 1901); *id.*, separ., p. 10; *id.*, Tabl. Opredel. Plastinch. ("Psov. i Ruzh. Okh.," 1900); *id.*, Sinopt. Tabl. Okh. Pt. R. I., p. 42 (1901); Macpherson, A History of Fowling, 1897, p. 219.
Bernicla canagica, Gray, Genera of Birds, iii. p. 607 (1844); Rchnb., Syn. Av. Natat., pl. 101, figs. 414, 415 (1845); Degl. and Gerbe, Orn. Eur., ii. p. 492 (1867).
Chloëphaga, canagica, Bonaparte, Compt.-Rend., xliii. p. 648 (1856); Baird, Birds of N. America, p. 768 (1858); *id.*, Cat. N. American Birds, No. 573 (1859); Elliot, Ill. American Birds, pl. 45 (1866); Dall and Bannister, Trans. Chic. Acad., i. p. 296 (1869); Dall, Notes Avif. Aleut. Isl. Unal. Eastw., p. 5 (1879); Adams, Ibis, 1878, p. 429.
Philacte canagica, Bannister, Proc. Ac. Philad., 1870, p. 131; Coues, Key N. American Birds, p. 283 (1872); Ridgway, Man. N. American Birds (1882); Elliot, Mon. Seal. Isl., p. 130 (1882); Nelson, Cruise Corwin, p. 95 (1883); Baird and Ridgway, Water-Birds N. America, i. p. 477 (1884); Coues, Key N. American Birds, 2 ed., p. 689 (1884); Stejneger, Proc. U.S. Nat. Mus., x. p. 135 (1887) (Bering Isl.); Taczanowski,

[1] Judging by the closed bills of the skins examined by myself, the number of teeth on each side of the upper mandible does not exceed 20. But the available material was inadequate.

Faune Orn. Sib. or., p. 1112 (1893); Salvadori, Cat. Birds Brit. Mus., xxvii. p. 109 (1895); Menzbier, in Slyunin's "Okhotsko-Kamchat. Krai," p. 347 (1900) (*Imperatorski gus*); Buturlin, Dikie Gusi Ross. I. ("Psov. i Ruzh. Okh.," 1901); *id.*, separ, p. 10.

Chen canagica, Newton, Encyclop. Brit., 9th ed., x. p. 778 (1879); *id.*, "Dict. of Birds," p. 374 (1893).

Anser (*Philacte*) *canagicus*, Palmén, Bidr. Sibirisk Ishafsk. Fogelf. Vega Exp., p. 421.

Adult Birds of Both Sexes

Head and whole hind-neck white, often with rusty (or yellow or amber-yellow) tinge, deepest on anterior part of head. Throat, fore-neck, and sides of neck brownish black. Prevailing colour of plumage of body bluish cinereous with black sub-terminal crescent-shaped bars, bordered with white. These black crescent-shaped bars are sharply defined on upper surface of body, somewhat fainter on breast and flanks, but almost totally absent on the abdomen. Tail pure white on terminal half, and greyish or slaty greyish basally. Lesser upper wing-coverts, primary coverts, and primaries dark slate. Greater wing-coverts slaty grey, bordered with white. Secondaries dark slate with white borders. Lining of wings and axillaries brown-grey. Bill and other naked parts, according to Nelson,—"lower mandible dark horn-colour, with a white spot on each side of branching rami; membrane about nares livid blue, rest of upper mandible pale purplish, with a fleshy-white wash; edge of nail dark horn-colour, rest of nail horn-white; iris hazel; legs and feet bright orange-yellow."

Immature Birds

Dark (black-brown) featherlets mingled in white of head.

Young Birds of the Year

All feathers of body far narrower than in adults, those of upper surface pointed. Head and neck slate-grey, former speckled with white, especially on crown. Transverse mottlings on feathers less marked than in adults. Bill and feet dark.

Young Birds of Second Year

Number of white featherlets on hind-neck considerable, giving it a very finely speckled appearance.

Apparently, in the young in down, the head and the whole of the neck should be dark slate, but this statement, it seems, is only an hypothesis and is not based on facts.

Total length of adult birds	650–700 mm. (= 25.5–27.5 in.).
Wing about	350–400 mm. (= 14–15.7 in.).
Culmen	35–49 mm. (= 1.37–1.92 in.).
Tarsus	66–72 mm. (= 2.60–2.85 in.).
Middle digit without claw	61–63.5 mm. (= 2.40–2.50 in.).

Geographical Distribution

In Russia this magnificent bird is as yet known to breed only in the Chukchi Peninsula, mainly on the river Anadyr; as a bird of passage it winters in Kamchatka, and

has been found on the Komandor Islands (Bering Isl.). At any rate, like Sevastianov,[1] I can refer the "white-necked geese," mentioned by Krasheninnikov in his *Opisanie Kamchatki*, only to this species.

I may here note that in the above work of Krasheninnikov, Sevastianov calls this goose *Anas canadicus*, having forgotten probably that eighteen years previously it was named and described by himself as *Anas canagica*, with the explanation that this name was given to the species on account of its inhabiting the island of Kanaga. From the river Uká, Kamchatka, there is an adult female in the Zoological Museum of the Imperial Academy of Sciences at St. Petersburg, which in size of bill (culmen = 49 mm. or 1.92 in.) exceeds very considerably the dimensions given by American ornithologists. The label on this female bears the name *Kurilski gus*.

A specimen from Bering Island, probably a male, brought by Mr. Grynewecki, is also a big bird, and somewhat exceeds the American measurements. Personally I do not at all doubt that this splendid goose will prove to breed even considerably westward of Chukchiland, along the shore of the Arctic Ocean. The fact of several aquatic birds having been quite lately found far more to the west of North-eastern Asia than they were supposed to range in the days of Pallas, points to the probability of many other analogous discoveries which at present we cannot even guess. So far, however, I can add nothing to the distribution of this species in the east; on the other hand I am compelled to pass more to the west and quote the statement of Messrs. Degland and Gerbe to the effect that Mr. E. Verreaux twice obtained this goose from his correspondent on the banks of the Volga: on the first occasion in 1849, and then again in 1853.

This last specimen was in the rich collection of Count Turati in Milan. Messrs. Degland and Gerbe express themselves on the subject to the effect that, of course, they see nothing impossible in such a fact, but that they included this species in their work under a note of interrogation, as a member of the European fauna, since while perfectly trusting Mr. E. Verreaux, they cannot guarantee the accuracy of the information of his correspondent. On this observation I may remark that it seems to me easier to grant the possibility of this goose accidentally straying from Eastern Siberia to the Volga,—the more that the western limit of its breeding-grounds in Siberia is quite unknown,—than to explain how otherwise these specimens could have come into the hands of Mr. Verreaux's correspondent at the date in question, when it is even now by no means easy to obtain a skin of this goose anywhere in Europe. Moreover it is hardly possible that Mr. Verreaux's correspondent even suspected the value and the scientific importance which his specimen represents. To suppose that these geese came into the hands of his correspondent from America is still more difficult than to believe that they were derived from Chukchiland.

[1] I here quote the words of Sevastianov, only omitting the description of the bird and its dimensions. The description is printed in vol. xiii., *Nova Acta Acad. Sc. Imp. Petrop.*, p. 341. I preserve the orthography. "En parcourant la précieuse collection d'oiseaux, apportée par Monsieur le capitaine de la flotte Billings de son voyage, fait dans l'Archipel des Isles situées entre les côtes orientales de la Sibérie et de Kamtchatka et les côtes occidentales de l'Amérique, et que l'Impératrice, de glorieuse mémoire Cathérine II., envoya à l'Acadèmie pour être conservée dans son Musée, j'ai trouvé quelques variétés d'oiseaux, et entre autres une nouvelle espèce de canard, qui à mon sçu n'a jamais été décrite par aucun des naturalistes connus, c'est pourquoi j'ai entrepris d'en faire la description et de donner la figure de cet oiseau, digne d'attirer la curiosité des Naturalistes par sa beauté et le mélange élégant de ses couleurs." Here follow the description and dimensions, which I omit. "Ce canard, dans le catalogue des oiseaux, rapportés par Mr. Billings, porte le nom systématique d'Anas canagica. Il est très probable que cette nouvelle espèce a été découverte par Mr. le capitaine Billings sur l'Isle Canaga ou Kyktak, une des Isles Aléoutes les plus proches des côtes de l'Amérique septentrionale, et situé derrière le cap Aliazka, et que le nom de l'espèce, c.à.d. canagica, a été imposé à cet oiseau du nom de la première île, ou de celui des principaux habitans de l'île Kyktak, appellée (sic) *Caniaques ou Canaques*, qui, peut-être, ayant apprivoisé cet oiseau l'ont rendu domestique. Ces (sic) sont des sauvages très belliqueux et que les Russes, dans un second voyage entrepris par Schelichoff, avaient beaucoup de peine à se soumettre. Je ne puis rien dire des mœurs et des autres particularités, qui regardent cet oiseau, car nous n'avons aucune notice sur le voyage, n'ayant jamais vu le jour et ayant été déposé dans les Archives du Collège de l'Amirauté, où il se trouve jusqu'à présent."

I am therefore rather inclined to believe that, from time to time, this goose strays to the Volga, as I do not consider such a range at all more improbable than the annual winter visit to the Caspian of the snow-goose.

Regarding North America, it is known that the emperor-goose lives in abundance along the lower reaches of the river Yukon and at its mouth, so that it is there the predominating species. It breeds also on the island of St. Michael and in Norton Bay. In winter it descends to Humboldt Bay in California. It migrates to Alaska about June 1 or somewhat earlier, according to the weather. As soon as the young leave the egg, the old birds begin to moult. Dall saw a half-moulted specimen in Pastolik on July 29, 1867. This goose lingers in Alaska longer than the others, until the shore is ice-bound, feeding on molluscs, such as *Mytilus edulis* and others; having been observed there by Russians till November 1.

The emperor-goose more often keeps in pairs or parties of four or five than in large flocks. Its note is purer and shriller than that of the white-fronted goose or Canadian goose, and in general it is more wary than all other geese, except perhaps *Branta nigricans*. According to Dall, its flesh and skin possess an insufferable smell of garlic, so that even skinning it is a very unpleasant operation, but on roasting this unpleasant odour vanishes, and the flesh becomes tender and tasty. Mr. Bannister, during his visit to the island of St. Michael, states that two young specimens were killed. He mentions the bad odour of the flesh, and says that in removing the skin this smell remains on the hands, so that it is almost impossible to wash it off. He considers the flesh of this goose uneatable by Europeans, but says that Indians and Eskimos eat it readily. This condemnation by Mr. Bannister is, however, refuted by Mr. Elliot, according to whom, on the Pribylov Islands, this species occurs only as a stray visitor,[1] and appears sometimes in such an exhausted condition that the natives take it in whole flocks, the members of which they pursue openly over the grass. Mr. Elliot found their flesh without unpleasant smell, and very good eating. According to this author the unpleasant odour is limited to the skin, and when the bird is properly charred entirely disappears.

The eggs of this goose, according to Mr. Adams (*Ibis*, 1878), have a dingy colour (according to other statements, sub-rufous), which, according to the investigations of Mr. G. F. Göbel, should indicate considerable porosity of the shell. The eggs have a breadth of 73.6–78.7 mm. (= 2.9–3.1 in.) and a length of 84.5–86.3 mm. (= 3.33–3.40 in.).

This exhausts the scanty information with regard to this goose at present available.

[1] During migration.

Genus *Anser*, Brisson (1760)

Bill, with nails and feet, entirely light-coloured; but in young birds nails on bill grey or horn-brown.

On abdomen (in adults) brown or black patches, sometimes confluent. Prevailing colour of plumage brownish grey.

THE GREY-LAG GOOSE

Anser anser, Linn.

Plate 3

English—*Grey-Lag*; *Grey-Lag Goose*; *Large Grey Goose*; *Gander* (♂); in Scotland (Gaelic) *Geadh-glas*; *Red-billed Grey Lag* (F. Coburn).

Russian—*Sery gus*; *diki gus*; *dikaya gus* (Little Russ.); *guska* (L. R.); *gusak* (♂); *gúsynya* or *gusýnya* ♀—(in south); *gusíkha* (♀—in north); *gusíkhna* (♀—in west); *gusyá*; *gusynyá* (various localities); *gusyónok* and *gusyónysh*, *gusyáta* and *gusenyáta* (goslings); *seryák kryzhnyák*; *krýzhen* (lower Don, neighbourhood of Azov); *korennoi* and *martovski gus* (Transbaikal, according to Kirilov); *reshník* (*i.e. rechnik*, according to Pallas); *guménnik* (Siberia, according to Pallas and others, and also Transural, according to Sabaneev); *rechnoi gus*; *sibirski sery gus* (Buturlin); *bolshoi sery gus* (Krasheninnikov).

Gruzinian—*Gareuli-bati.*

Armenian—*Sag.*

Persian—*Kazh.*

Tatar—*Kaz, gaz, khaz.*

Kirgiz—*Kongur-kaz.*

Vogul—*Yakh*; *yalunt*; *lunda*; *aslunt.*

Ostiak—*Yugan-lont*; *aslont.*

Samoyed—*Chuik*; *ieptu* and *iettu*; *dyötto* (Yenisei); *tyoku* (Keta).

Chuvash—*Khor* and *Khur.*

Mordva—*Mazi.*

Cheremis—*Kamba.*

Votiak—*Shadshek.*

Pumpokol—*Kham.*

Imbatskin—*Tem.*

Assan and Kotov—*Sháme.*

Arin—*Sam.*

Mongol—*Galu.*

Buriat—*Changir-kholón* (Kirilov).
Kalmyk—*Galun*; *chenkir-galun*.
Kamashin—*Tashu*.
Karagaz—*Gai*.
Koibal—*Taoze*.
Tunguz—*Nunyàki*.
Lamut—*Arbàs*.
Yukagir—*Lancha*.
Koriak—*Kheitóait*.
Kamchadale—*Ksùde*.
Kuril—*Kuitúp*.
Japanese—*Gan* (Pallas).
Polish—*Ges gengawa*.
Est—*Mets ani* (?)
Lett—*Mescha sohs*.
Finn—*Hanhi; harmaahanhi*.[1]
French—*Oie cendrée*; *oie sauvage*; *oie vulgaire*.
German—*Stammgans*; *Wildgans*; *Märzgans*; *Sommergans*; *Hagelgans*; *Graugans*; *Graue Gans*; *Grosse Graugans*; *Grosse Wilde Gans*; *Heckgans* N.S.W.

Anas anser, Linn., Syst. Nat., i. p. 197 (1766); Habligl, Phys. Beschr. d. Taur. Statth., p. 309 (1789).
Anas anser ferus, Bechstein, Orn. Taschenb., ii. p. 415 (1863).
Anser cinereus, Meyer, Taschenb., ii. p. 551 (1810); Brehm, Vög. Deutschl., p. 835 (1831); Naumann, Vög. Deutschl., xi. p. 229, pl. 285 (1842); Nordmann, J. f. Orn., 1864, p. 326; Fritsch, Vög. Eur., p. 408, pl. 45, fig. 8 (1870); Dresser, Birds of Europe, vi. p. 355, pl. 41 (1878); Finsch, Verh. zool.-bot. Ges. Wien, 1879, p. 258 (Zap. Sibir); Degl. and Gerbe, Orn. Eur. ii. p. 479 (1867); Radde, Ornis. Cauc., p. 445 (1884); *id.*, Bull. Soc. Mosc., 1854, iii. p. 160; Radde and Walter, Die Vög. Transcasp., p. 120 (1888); Radde, Sib. R., ii. p. 358 (1863); Schrenck, Vög. Amurl., p. 465 (1860); Zarndny, Orn. F. Zakasp. kr., p. 439 (1896); *id.*, Rech. Zool. Bull. Soc. Mosc. (1890); Zarndny, Orn. F. Or. kr., p. 222 (1888); *id.*, Dopoln. k. Orn. F. Or. kr., p. 108 (1897); Nikolsky, Pozv. Zh. Kryma, p. 288 (1891); *id.*, Bull. Soc. Mosc., No. 4 (1892); Sabaneev, Trudy Yarosl. Stat. K., p. 284 (1868); *id.*, Ukaz. Kn. i St. Zool. i Okh. Sod., pp. 455-458 (1883); *id.*, Prolet Gusei, "Zhurn. Imp. Ob. Okh.," 1874, i., ii.; Przewalski, Put. Uss. kr., 1870; *id.*, IV. Putesh. Tsentr. Az., p. 327 (1888); Zhitnikov, M. "Psov. i Ruzh. Okh.," 1890; (Nabl. na r. Atreke); *id.*, separ., *passim*; Buturlin, Opredel. Plastinch., "Psov. i Ruzh. Okh.," 1890; *id.*, separ., p. 8; *id.*, Dikie Gusi R. I., "Psov. i Ruzh. Okh.," 1901; *id.*, separ., p. 12, etc.; Kessler, Russk. Ornit., p. 372 (1847); Eversmann, Or. Kr., iii. p. 552 (1866); Menzbier, Pt. Ross., i. p. 748 (1895); *id.*, Okh. i Prom. Pt. Ross. i Kavk., p. 477, pl. 137 (1902); Yakovlev, Bull. Soc. Mosc., 356, 1872; Büchner and Pleske, Beitr. z. Orn. S. P. G., 1881, No. 175; Büchner, Pt. Spb. g., p. 512 (1884); Porchinsky, Tr. Spb. Ob. Yest., iii. 1873, p. 376; Pleske, Th., Säug.-Vög. Kóla Hlbns. (Beitr. Kennt. R. R., ser. 2, 1886, p. 232; *id.*, Rev. Turk. Orn., p. 54) (1888); Zhitnikov, M., Osenni pr. dol. r. Murgaba, "Psov. i Ruzh. Okh.," 1897, pt. iv. p. 65; Göbel, Vög. Kr. Uman (Beitr. Kennt. R. R., ser. 2, 1879, p. 206; Somov, N. N., Orn. F. Khark., p. 442 (1897); Bogdanov, M. N., Ptitsy i Zveri Povolzhya, p. 146 (1871); *id.*, Pt. Kavk., p. 171 (1879); Radde, Mus. Cauc., B. I. (1899), p. 212; Taczanowski, Faune Orn. Sib. Or., p. 1089 (1894); Severtsov, Per. Yavl. Vor. gab., *passim* (1855); *id.*, Vert. i Goriz. raspr. Turk. Zh. (1873); Alphéraky, Kuldzha i Tianshan (1891), pp. 25, 47, 145; Palmén, Cab. Journ. f. Orn., xxiv. s. 52 (1876); Nikolsky, Faun. Mlek. i Pt. Priaralsk., Bull. Soc. Mosc., No. 4 (1892); Sushkin, Pt. Uf. gub., p. 78 (1897); Deryngin, Orn. Izst. Psk. gub., Trudy I. Spb. Ob. Yest., vol. xxvii. (1897); *id.*, vol. xxix., pt. 2 (1898); David and Oust., Ois. Chine, p. 491 (1877); Severtsov, Zeitschrift Ges. Orn., 1887, p. 22; Hume and Marshall, Game Birds Ind., iii. p. 55 (with pl.) (1880); Silantyev, Opred. Yevrop. Pt., 1901, p. 112; *id.*, Obzor Prom. Okh. Ross., 1898, p. 110; Kholodkov i Silantyev, Pt. Yevr., p. 521, pl. 42, fig. 1 (1901); Maak, Amur, Prib., p. 144 (*gus gumennik*) (1859); Brauner, Zametki o Pt. Khers., separ., p. 32 (1894); *id.*, Kratkiya opredel., Dichi Stepn. pol. Rossii, 1897, p. 100;

[1] Although Malmgren gives the name *Metsahanhi* (wood-goose) for the grey-lag, it is evident, as observed already by F. D. Pleske in his work on the animals of the Kola Peninsula, that this name belongs to bean-geese (*M. arvensis*).

Johansen, Nauchn. Ocherki Tomsk. kr., 1898, Omd. ptits, p. 65; Khomyakov, Pt. Ryaz. (Mat. pozn. Faun. i Fl. R. I., Omd. Zool., pt. 5 (1900)); Lorenz, Die Vögel Mosk. Gouv., p. 58 (MS. note of author on absence in Mosc. Gov.) (1894); Ruzsky, M., Trudy Obshch. Yest. pr. Kaz. Universit., xxv. pt. 6, p. 115 (1893); Zarndny, Ekskur. Sev.-vostochn. Pers., Pt., p. 105. "Zap. Imp. Ak. N.," viii. ser., vol. x., No. 1 (1900); Pleske, Th. Orn. Ausb. Gebr. Grum-Grzym. Centr. As. (Mél. Biol., xiii. p. 298, 1892); Buturlin, Sinopt. tabl. Okhotn. Pt., p. 45 (1901); Karamzin, Pt. Bugur., Bugulm. i t. d. Ufimsk., p. 180 (1901); Kirilov, Okh. i Okhotn. Khozyaistvo Zabaik. ("Prir. i Okhota," 1902, iii.); Göbel, G. Oolog. MS. (1902); MS. inserted at length in this work.

Anser vulgaris, Pallas, Zoogr. Ross.-As., ii. p. 222 (1811); Vavilov, Okhota v Rossii, pt. 4, p. 37 (1873); Yablonsky, "Prir. i Okh.," 1891, vii. (Okh. v Minusinsk. uyezde Yenis.).

Anser ferus, Schaeff., Mus. Orn., p. 67 (1789); Stephens, Gen. Zool., xii. p. 28, pl. 41 (1824); Gould, Birds of Europe, pl. 347; Salvadori, Cat. Birds Brit. Mus., xxvii. p. 89 (1895); Artsibash., Bull. Soc. Mosc., 1859, iii. p. 99; Blanford, Fauna Brit. India, Birds, iv. (1898), p. 416; Finn, How to know the Indian Ducks, 1901, p. 14; Macpherson, History of Fowling, 1897, p. 222.

Anser palustris, Fleming, Brit. Animals, p. 126 (1828).

Anser sylvestris, Brehm (nec Brisson), Vög. Deutschl., p. 836 (1831).

Anser cineraceus (errore), Marchand, Revue et Mag. Zool. (1877), p. 355, pl. 14 (*pullus*, pl. cxxxv.).

Anser anser, Hartert, Kat. Vogelsamml., p. 226 (1891); Oates, Man. Game Birds of India, ii. p. 90 (1899).

Anser rubrirostris (Hodgson, *Icon. ined.*), Salvadori, Cat. Birds Brit. Mus., xxvii., 1895, p. 91; Gray, Cat. Hodgson Coll. Brit. Mus., p. 144 (1846); Zhitnikov, Nabl. na r. Atreke ("Psov. i Ruzh. Okh.," 1900); *id.*, separ., p. 56, etc.; Buturlin, Dikie Gusi R. I. ("Psov. i Ruzh. Okh.," 1901, Febr.-Apr.); *id.*, separ., p. 13; Coburn, F., "The Zoologist," 1903, p. 46.

Anser cinereus var. *rubrirostris*, Swinhoe, Proc. Zool. Soc. London, 1871, p. 416 (Shanghai); Przewalski, Mongol. i str. Tang, ii. p. 149 (1871); Buturlin, Opred. Plastinchatokl. ("Psov. i Ruzh. Okh.," 1900); *id.*, separ., p. 9 (*Sibirsky sery gus*).

Anser cinereus β subalbifrons, Severtsov, J. f. Orn., 1875, p. 184 (*nomen nudum*).

Anser cinereus rubrirostris, Seebohm, Hist. Brit. Birds, iii. p. 501 (1885); Zarndny, Eksp. Vost. Persii, 1901, pp. 122 and 138.

Anser ferus s. vulgaris, Sevast., in note to Opisanie Kamchatki, Krasheninnikov, pp. 473 and 488 (1818).

Sery gus, Aksakov, Zap. Okhotn. Or. g., p. 150 (1852) (2nd ed.).

Adult Male

Head, neck, and anterior half of back grey-brown; scapulars grey-brown, with lighter greyish edges. Around base of bill a narrow, more or less interrupted, white streak, which, as in some other geese, and in particular the Chinese goose, is sometimes coloured more or less bright rufous or rusty. Generally this streak, 2-3 mm. in width at its broadest part, *i.e.* on forehead, is broken at the bare angles of upper mandible, so as to be sometimes reduced to a mere white patch on forehead and to a lesser patch on each side of the base of bill. This white streak attains its greatest development in very aged ganders; but cases occur where the white patch attains a far greater development on the forehead than usual, and, probably, on the basis of such a specimen Severtsov established a variety—*β subalbifrons*, without, however, giving a description (*Journ. f. Orn.*, 1875, p. 184).

Lower back and rump light ashen grey; upper tail-coverts white. Fore-neck, breast, and abdomen light greyish brown; on abdomen more or less numerous transverse black bars, scattered or more or less confluent, the latter apparently occurring in older birds.[1] Lower abdomen, vent, and lower tail-coverts white. Tail usually consisting of 18 feathers,[2] coloured as follows: two outer ones white on each side; two middle greyish brown, with white tips; the rest for the most part greyish brown, with very thin outer white margins, while their inner webs pass, more or less gradually, towards the edge into whitish, the tips however being all white. Sides of body brown with lighter grey edges to feathers, producing a transverse light-barred appearance. Upper lesser wing-coverts, carpal, winglet, primary coverts, and primaries themselves in basal third very light ashen grey; middle

[1] The same observed in white-fronted goose and in lesser white-fronted goose.

[2] There are statements as to the number of tail-feathers sometimes reaching 20.

and greater wing-coverts, secondaries, and tertiaries brown; latter, like primaries with white shafts, becoming brown only at apex. Middle and greater wing-coverts with whitish edges on outer webs. Under wing-coverts and axillaries light ashen grey.

As the colouring of the bill itself is described in more detail below, it will suffice here to note that the number of teeth on each side of the upper mandible in nearly all the specimens I have seen varied between 21 and 23, although, to my surprise, in a male brought by Col. Przewalski from Koko-Nor, I found 28.[1] A character very sharply distinguishing this goose from the species of the genus *Melanonyx* is the colour of the teeth, which in all grey-lag geese are yellowish white, while in the latter they are dark, sometimes almost black, and only in a few specimens yellow at the spot where the yellow band reaches them at the apex of the bill. The bill itself is of more or less vivid pink flesh-colour, but as a rare exception yellowish orange;—a point to which we shall return later. Nail of upper mandible in majority of cases white or horny white, or greyish white, with slight bluish tinge.

Iris brown; legs and feet, normally, flesh-colour; claws black.

Adult Female

This is distinguished from the gander in nothing except the somewhat inferior size and, on the whole, less weight; but it must be remembered that large old females may considerably exceed in both respects small although fully adult ganders.

Before giving the dimensions of adult birds, I may discuss in somewhat greater detail the colouring of the bill.

In *British Birds, their Nests and Eggs*, Mr. J. Cordeaux states that a friend of his killed a grey-lag in Lincolnshire, whose bill, with the exception of a narrow strip in front of the white nail, was orange. Since then I have received information from Mr. Frohawk that, in the opinion of certain competent ornithologists, in the Scotch representatives of this goose the bill is regularly yellow-orange in colour. In regard to this, I wrote to Mr. Frohawk approximately as follows: "At the present time, as is well known, in Great Britain this species is resident only in Scotland and the Hebrides. This being so, it seems to me evident that among such resident birds there occur fat, well-fed specimens. That in the yellow-orange colouring of the bill the subcutaneous layer of fat plays the chief part I have no doubt, as I maintain also in the case of the white-fronted goose. There are also many striking examples among other species of far better fed and heavier resident birds being compared with migratory birds of the same species or those that only come for the breeding season. We know, for example, that the mallard, living permanently in any locality, far exceed in weight those merely passing or coming to breed; and at the same time we know that only among resident mallard (sometimes reaching 5 lbs. in weight) occur specimens with bright orange bills, which are never found in migrating birds. We also know that resident grey partridges considerably exceed those migrating (in autumn) in size and weight, and have the legs yellowish, while in migrating birds these are always of a more bluish hue. Here also I attribute the difference in the colouring of the legs to the presence or absence of a subcutaneous fat layer. However this may be, yet, speaking of migrating grey-lag geese, no responsible author mentions their having orange bills. Sir R. Payne-Gallwey writes, for instance, that in England 'the bill (of the grey-lag goose) is of a uniform flesh-colour, except the white nail. Legs and feet are flesh-colour.'"

[1] I cannot as yet say anything of this, in my opinion, strange case, but it would be very desirable that sportsmen, having occasion to shoot grey-lag, should direct attention to the number of teeth of the birds they kill, whereby, perhaps, might be explained how far such a variation is normal, or, on the contrary, exceptional.

Dimensions of Adult Birds of Both Sexes

Total length	762–889 mm. (= 30–35 in.).
Expanse	1422–1778 mm. (= 56–70 in.).
Wing	398–482 mm. (= 15.75–19 in.).
Culmen	61–71.5 mm. (= 2.4–2.8 in.).
Bill from gape	64–76 mm. (= 2.5–3 in.).
Depth of both mandibles at base	37–37.5 mm. (= 1.45–1.47 in.).
Greatest depth of lower mandible with shut bill	10–10.5 mm. (= .40 in.).[1]
Tarsus	64–81.5 mm. (= 2.5–3.2 in.).

Weight from 5 lbs. 12 oz. to 12 lbs. and, exceptionally, in some European specimens, 16½ lbs. (according to Naumann).

Young Birds

On the whole, darker-coloured than adults, and without black bars on abdomen. Bill either very light flesh-colour or even yellowish green, with here and there a faint pink hue, as, for example, at the edges of the upper mandible. White feathers along base of bill entirely absent. Brownish black spots do not appear on the abdomen, and then scantily, before the age of 2 years. Grey-lag geese attain fully adult dress not earlier at any rate than the age of 4 years. In young birds, feet and legs usually of same colour as bill, often pale yellowish green.

Young in Down

Upper part of body olive-brown; forehead, sides of head, hind-neck, part of breast, and flanks greenish yellow; rest of under-surface yellowish white. Bill and feet pale fleshy, but perhaps sometimes more vivid flesh-colour.

Here I may quote certain information supplied by Mr. A. O. Hume on the degree of individual variations in this species, information which, although pertaining exclusively to birds obtained in India, nevertheless should be applicable to European, and, especially, to Siberian representatives of this goose, the more so that some of these latter undoubtedly winter in India.

"The plumage of our birds," writes this excellent observer, "varies a good deal. In some, which I take to be the young, the lower breast and the whole abdomen to vent are pure white; in many they are strongly tinged with sandy or orange; in others very thickly and conspicuously mottled with brownish black. The head and neck vary from pale ashy or earthy brown to dark clove-brown; in most there is a mingled white and orange patch on the forehead.[2] In some there is a similar spot at the base of the upper mandible on each side, just above the gape. Often, in birds killed just before they leave us in March or April, most of the feathers of the head and cheeks are obscurely tipped with orange, and traces of this are seen on the whole neck. I note that most of our birds have a tiny patch of white on the centre of the chin.

"In some specimens the breast and abdomen are so closely blotched and mottled with black or blackish brown, and pale rusty buff (the former predominating), as to leave no other colour visible. The black markings will sometimes continue to within an inch of the vent, the pale rusty colour to 2½ inches beyond this. In some specimens the gathering of the feathers of the upper neck into parallel longitudinal ridges is most marked; in others it is

[1] This measurement is based on an insufficient number of specimens, and therefore can hardly be considered as the maximum.

[2] This will be the white rusty or bright rusty streak at the base of the bill which Radde speaks of, and which was taken by some authors for a bright-red base of the bill.

quite wanting. In some the cap and back of the upper neck are conspicuously darker; in some they are absolutely uniform in colour with the rest of the neck. Generally the whole tone of the plumage varies much more than it usually does in wild birds, or than it does in any other goose with which I am acquainted;[1] and though the brownest is never so brown as either *segetum*, *brachyrhynchus*,[2] *albifrons*, or *minutus*, and the greyest never so grey as *indicus* (*E. indica*), still some are very much darker and browner, and some very much paler and greyer than others."

Notwithstanding the seemingly especially great tendency to variation of different individuals of this species noted by Mr. Hume, I must say that from the material I have examined, as well as from the comparison of descriptions, I have come to the conclusion that the individual variation in the colouring of the plumage and of the naked parts in all species of geese is subject to innumerable changes, making it absolutely impossible to give a description capable of completely suiting each separate specimen of a given species.

The same variations mentioned by Mr. Hume in regard to the grey-lag are also met with in no less degree in the greater and lesser white-fronted geese.

Having once touched on the question of the variable coloration of the grey-lag, I may here also point out the reasons which induce me to make no distinction between the European and Asiatic birds, although such a distinction has latterly been recognised by many ornithologists. Pallas held that the Siberian bird is distinguished from the European form both by its greater size and brighter-coloured bill, eyelids, and feet, as well as by the richer colouring of the plumage. Much later, as appears from the synonyms quoted above, the oriental form was separated by various authors under the name of *rubrirostris*, by some as only a variety, by others as an independent species.

And yet, so far as I have been able to convince myself from the careful investigation of this question, there can hardly be found sufficient grounds for splitting the grey-lag goose into two geographical races, much less into two species. I will strive to prove this as shortly and clearly as possible.

Pallas states that the Siberian variety is larger than the European form; but this, on comparison of the measurements and weight of birds given by other authors, is not the case. Even the great weight of certain Transcaspian specimens quoted by Mr. Zhitnikov, namely, 12 lbs., does not exceed that of some West European individuals, given, for example, by Naumann, who reports giants of 16½ lbs.! According to this extremely careful and well-informed ornithologist, 11-lb. grey-lag geese often occur. Mr. Hume, who cites dimensions and weight of grey-lag geese obtained by him in India, where beyond doubt the form *rubrirostris* should occur, says that their weight varied between 5 lbs. 12 oz. and 8 lbs. 14 oz., and that not a single specimen weighed a full 9 lbs. As regards dimensions, we also see that only in rare cases do Indian specimens excel the European, and this too, it must be surmised, because among the number of geese killed there giants sometimes occur of 35 in. (=889 mm.) in length, which must undoubtedly be birds of very great age. It must further be remembered that Mr. Hume, who personally shot in India several thousand grey-lag geese, attributes such size to their age.

Although, of course, no small number of these birds are shot in Europe, yet there is hardly a sportsman reckoning his bag of geese by thousands. Besides this, it is beyond doubt that in Europe adult, yet comparatively young, birds are far more often killed than old

[1] The white-fronted goose is subject to similar great variations.

[2] Not *brachyrhynchus*, but *neglectus*, Sushkin.

ganders, which occasionally yield such exceptionally large dimensions. This last supposition of mine is confirmed, among other things, by Aksakov's description of grey-lag geese, in which he calls their bills and feet yellowish green, *i.e.* coloured as these parts are only in young birds, and adult, but not old, females. Regarding the richer colour of the plumage of Siberian birds spoken of by Pallas, I must acknowledge that I could not discern it from an examination of the skins in the museum of the St. Petersburg Academy. And Taczanowski, in his ornithological work on the birds of Siberia,[1] states just the contrary, namely, that "these geese of Eastern Asia seem to us lighter-coloured than the geese of Europe," with which in general I agree. As to black or black-brown patches on the abdomen, no better case is afforded for splitting the grey-lag into two races or two species, seeing that these patches are subject to considerable individual variation, and undoubtedly increase in number and in size with the age of the bird, as is the case in the greater and lesser white-fronted geese.

In connection with the remarkable longevity of geese, of which I have already had occasion to speak in the Introduction, it is clear that these patches must spread more and more with age, and may at last occupy almost the whole belly.

But the third and most important character, cited by authors for the distinction of the Asiatic from the European form of the grey-lag goose, is the supposed bright red base of the upper mandible!

This alleged characteristic is founded on an extremely strange error; the authors who, quoting Dr. G. T. Radde[2]—the sole source whence they derived this information—putting an entirely wrong interpretation on what my late respected friend wrote. The same essential mistake was made by Taczanowski, and, probably after him, by Count Salvadori and others.

The passage in Dr. Radde's account may be literally translated as follows: "In this bird I notice that around the base of the upper mandible there is a very conspicuous rusty brown colour, which passes, as a narrow band, beset with numerous white feathers, embracing the base of the bill, into a fiery foxy red. Further, the whole bill of the bird was dingy white. Otherwise our bird completely agrees with European specimens." Thus this fiery rufous colour of the feathering at the base of the bill has been transferred by certain authors to the base itself of the bill—a mistake which has given rise to a whole series of erroneous interpretations and deductions.

In view of what is stated above, and as I do not find a single character by which it is possible to distinguish the oriental from the western representatives of the grey-lag, I decide to regard *Anser rubrirostris*—by some considered a separate form—as a mere synonym of *Anser anser*, as has already been done by Mr. Oates.[3]

Geographical Distribution

Seeing that I place the western and eastern forms of this species together, the determination of the extent of its distribution becomes a considerably less complex matter than it would be if there really existed two different forms of grey-lag goose. The species breeds from Iceland in the west to the Ussuri district in the east, as well as in

[1] *Faune ornithologique de la Sibérie orientale.*

[2] *Sib. Reis.* ii. p. 358: "Auch an diesem Vogel sehe ich um die Oberschnabelbasis einen recht eclatanten rostbraunen Ton sich verbreiten, der auf einem schmalem, vielfach von weissen Federchen durchsetztem Bande, welches die Schnabelbasis einfasst, zu brennendem Fuchsroth gesteigert wird. Ausserdem war der ganze Schnabel dieses Vogels schmutzig weiss."

[3] *The Game Birds of India*, Part II. p. 42 (1899).

Kamchatka, as is testified by both Pallas and Krasheninnikov, who quote the native names under which it is known in the latter peninsula. In Siberia, this species ascends to the Arctic circle only along the Obi, whence, to the east, the northern limit of its breeding-grounds rapidly descends and hardly anywhere eastward of 80° E. long. oversteps 56° N. lat. To determine the southern limit of its nesting over this vast area is very difficult. Apparently, however, the grey-lag goose breeds in Spain, and over the whole northern shore of the Mediterranean, throughout Transcaucasia, and in Persia. It has not been yet found, even wintering, in the north-eastern corner of Africa, neither has it been met with breeding in India, where, as we shall see, it winters in enormous numbers. Przewalski found it breeding on Lob-Nor, and it nests everywhere in Turkestan. As to European Russia, there is no doubt that at a comparatively recent date there were far fewer spots where the grey-lag was not known to breed than there are now. It is also beyond doubt that with every year the area of its nidification is rapidly contracting in accordance with the growth of the population, and also in consequence of the rapid strides in the diminution of inland waters. On all sides lakes and fens are drying up or being destroyed; rivers are lacking water, and the secure and open situations so absolutely necessary for the propagation of this very timid and shy bird are constantly becoming fewer and fewer. We learn from the *Ptitsy Rossii* of Prof. Menzbier that this goose no longer breeds in Poland, that it has been expelled from the Tula Government; while from Mr. Lorenz we know that not only does the grey-lag no longer breed in the Moscow Government, but that it is not now to be met with there even on migration. Apparently, indeed, there are many other places in European Russia where this bird has already ceased to breed. In European Russia, the northern limit of its breeding-grounds crosses the Arctic circle and reaches as far as the Varanger Fjord.

Messrs. Alston and Harvie-Brown[1] saw many of these geese in the neighbourhood of Archangel, and as they left this locality in July, it is clear that the birds were nesting.

Farther to the south, it is found along the shore of the Gulf of Bothnia.

"The latter region extends into Finland proper, where the grey-lag breeds in the broad coast zone of the Gulfs of Bothnia and Finland, being common in the Uleaborg Government and scarce farther south," writes Prof. Menzbier. Whether this bird occurs on migration in the interior of Finland I cannot say, although I have observed for several years running flights of geese and swans on one of the lakes of the Vyborg Government. I have not once seen specimens, but from inquiries among the inhabitants, I conclude that at times, although rarely, large bean-geese (*Metsänhanhi*), lighter in colour than the common type, alight on their passage. It is well known that the grey-lag nests here and there among the lakes of the Baltic provinces. Its breeding in the St. Petersburg Government is now thoroughly established. For instance, as I am informed by Mr. V. L. Bianchi, at the "Seraya Loshad" headland, Peterhof district, three or four pairs yearly build their nests, and the young are then reared by the peasants. Thus, on July 7, 1900, three broods of 7, 5, and 12 birds were observed there; and 4 goslings of the size of the mother shot. This goose undoubtedly breeds also at the present time in the Governments of Pskov, Novgorod, Kiev, Chernigov, Bessarabia, on the swampy eyots of the Dniester and Dnieper, and over the whole of South Russia including the Crimea, the lower reaches of the Don, the whole of the Northern Caucasus (Kuban, Terek, etc.), the Manych Steppe,[2] Transcaucasia, and the islands (and presumably shores) of the Caspian. It is very abundant in suitable spots of Transcaspia, as,

[1] *Ibis*, 1873, p. 70.

[2] That geese breed on the Manych Steppe is an undoubted fact, but of what species I could not ascertain, although they can only be grey-lag.

e.g., in the Merv oasis, where, moreover, it is a constant resident, and where the inhabitants keep wild geese in large numbers reared from young in down taken alive or hatched from collected eggs. Even in Persia, one of the important winter haunts of this bird, it breeds and is resident in some spots. As has been already said, we also find it nesting throughout Turkestan. Returning to European Russia, we find it breeding in the Governments of Yaroslavl, Vladimir, Simbirsk, Kazan, Voronezh, along the whole of the middle and lower Volga (here in large quantities [1]), and throughout the Cis and Trans-Ural. Great numbers also breed in the Governments of Orenburg, Ufa, Kostroma, Perm, Yekaterinburg (especially large flocks), and Vyatka. In the central and southern Governments, save perhaps a few isolated spots, wherever there are suitable open places, the grey-lag breeds even now. During migration, indeed, it is probably met with over the whole of Russia, although, as we have already said, it is apparently no longer found in the Moscow Government; but if it is not seen there even on migration, this is not enough to prove that it does not pass over that district. Most probably it no longer alights there during its flight, that is, does not drop to rest. I have already stated in general terms that in Siberia, from the lower course of the Obi, where the breeding-grounds overstep the Arctic circle, their northern limit falls rapidly towards the east. Thus we know roughly that the species nests in the Tomsk region, thence on to Lake Baikal and Transbaikalia, Northern Mongolia, the upper waters of the Amur, and the whole of the Ussuri district. The determination of a more exact northern or southern boundary to the breeding-grounds of this species on the Asiatic continent is not, however, at present possible. There is no doubt that to the south of the points mentioned it nests in abundance; but the question is how far to the south it descends for this purpose. If the expedition to the Altai, under Prof. N. F. Kashchenko, in 1898, did not meet with this goose, this by no means proves that it does not nest there at all. The Altai is an extensive region, and no doubt spots may be found there perfectly adapted to this species, which breeds in the whole of Zungaria. In the Thian Shan I observed considerable numbers, not only in the foot-hills, in the valley of the Ili, but at a height of 7000 feet, on the Yuldus plateau, and do not doubt that it occurs everywhere on suitable waters. In Mongolia, as we shall see later, Przewalski found it breeding. The opinion that it does not nest but merely winters in China seems to me extremely doubtful; and although it winters in China in large numbers, it may be confidently supposed that it breeds there in places, and also is here and there a permanent resident. As to India, it must be supposed that this country only serves as winter quarters for a number of grey-lag bred in more northern regions of Asia, especially Siberia and the whole of Turkestan.

I will now endeavour to indicate as briefly as possible the breeding-grounds and winter haunts of this goose in other districts. Besides the whole of the continent of Western Europe, where it breeds universally, wherever conditions permit, we know that the grey-lag nests in numbers in the north of Norway on all the islands adjacent to the mainland. In Iceland, Messrs. Pearson found young goslings of this species on July 1, 2, and 3, 1894. Formerly it bred plentifully on Lake Sorvaag, in Faröe, but it has long since been driven away by the inhabitants, so that it is now met with only during its two migrations. In Great Britain it was formerly an ordinary resident, but at the present time it is no longer found either in England proper or in Wales or Ireland, but only in the more northerly portion of Scotland and in the Hebrides. In Spain, especially in the marismas and lagunas of the southern half of the country, grey-lags are found in considerable numbers, while they

[1] "Priroda i Okhota," 1875, Feb. and March, *Primorskaga Okhota pod Astrakhanyu.*

winter there in such masses that Mr. A. Chapman states, in one of his most charming books, that he saw in Spain in one day probably more of these geese than arrive in England during scores of years. The grey-lag also winters on the larger Mediterranean islands, where it may occasionally nest. In Tangiers and Algeria this bird is met with in winter, but, as we have already said, it does not occur on the north-eastern coast of Africa. It has also been stated to be unknown in Asia Minor, but this I very much doubt, seeing that, although there are no direct indications of its wintering on the southern shores of the Black Sea, I am firmly convinced the grey-lag must winter here, and that too in large numbers. Otherwise there is no explanation of the destination of the large flocks which leave their winter quarters on the coasts of the Crimea and Sivash in severe and snowy winters. As we have already said, a large number winter in Persia, and in the central part of the country are found nesting in the depression of Seistan (Zarndny). The species not unfrequently winters in Afghanistan. In Eastern Turkestan it breeds and is locally resident, as likewise in Kashgar; and in the Himalaya, Nepal, Kulu, and Kashmir the grey-lag is met with in winter up to an altitude of 6000 feet. In India itself the numbers wintering are enormous, but I do not know of any authentic case of its breeding there.

This is what Przewalski[1] says of the grey-lag: "It is found breeding in South-eastern Mongolia and in the valley of the Yellow River. Here, in the reeds of Tsaidamin-Nor, we found at the end of July, besides young birds nearly ready to fly, old ganders moulted to such an extent that they were quite incapable of flight, and only escaped from our dog's pursuit by running; in doing so these ganders had recourse to various ruses, as, for example, doubling back or making abrupt turns on one side, in order to conceal their track, and, in the last resource, crouching down among the tussocks.

"In the spring the species described appeared in South-eastern Mongolia in the middle of March, perhaps even earlier; in Tsaidam the first arrivals were noticed on February 18.

"On Koko-Nor *gumenniki*[2] were not rare in the last third of March; in the middle of October we also still saw here a few pairs on migration. In the valley of the Khuan-khe the autumn flight began from the end of August. In the mountainous region of Gan-su this species was not found. In general, even during their migration, we noted here as occasional visitors only six species of waterfowl, of which only one (*Anser indicus*) breeds on the upper waters of the river Tetung."

The same traveller further states that "in the basin of Lake Khanka, *gumenniki* arrive in the middle of March, and breed in small numbers among the lakes. In autumn also there are but few of this species compared with the great masses of other geese, especially *Anser minutus*."[3]

These data exhaust all that is known regarding the geographical distribution of the grey-lag.

Passing on to the description of the habits of this species, it may be mentioned that, as in the case of the mallard, if all that has been written on the subject were brought together, it would exceed in volume all our information on the other geese taken together. On this account I shall confine myself to noting only the most essential points in regard to its

[1] *Mongoliya i strana tangutov*, ii. p. 149 (1876).

[2] Our italics. Przewalski always calls the grey-lag *gumennik*, by which name it is known almost everywhere in Siberia.

[3] *Anser finmarchicus* of the present work.

mode of life, breeding, migrations, and winter quarters; and I do not undertake to give an exhaustive statement of all that is known in these respects, since the compilation would occupy too much time and labour.

Passing over, then, such attributes and habits of this species as are common to geese in general, I have endeavoured to discuss in some detail those which are peculiar to the grey-lag.

The grey-lag arrives at its breeding-grounds earlier or later, according to the latitude in which these are situated. In the temperate zone the geese appear as early as February or the beginning of March; later in the more northerly, and earlier in the more southerly districts, although, on the whole, the birds may be said to arrive in the early spring.

They almost always come in considerable flocks, cackling incessantly, and immediately on arrival proceed to look for suitable places for building their nests.

The older birds, although flying in the general flock, are already paired, as, like the swans, grey-lags pair once for all. The young birds begin to pair immediately on arriving at the spot; this being usually accompanied by fights among the ganders of the same age, and the pursuit of females by males, as occurs in ducks. The younger birds which are not yet sufficiently mature to breed, hold aloof from the adults in separate small flocks, although in the neighbourhood of the breeding-grounds of the latter. When the site has not undergone any essential change since the previous year, the geese usually occupy the same places for their nests as before, perhaps even the same tussocks and bushes where last year's nests[1] were situated. In densely populated localities the grey-lags usually build their nests in the safest and least accessible spots, where man's foot appears but rarely or not at all; if in the neighbourhood of great lakes, they usually nest at a considerable distance from the shore, or on islands overgrown with vegetation and surrounded by deep water, in moist places, or in such reedy recesses as are most secure from man on account of their inaccessibility. In desolate regions, where the geese feel themselves relatively safe, they may be met with breeding even on small streams, whose banks are overgrown with rushes or other tall or thick vegetation sufficient to hide the nest, and later on, in case of danger, the young goslings. Along such small streams I have occasionally started pairs of old birds from their nests in the valleys of the Ili among the foot-hills of the Thian-Shan.

The nest is built by both parents with all kinds of dry materials—reeds, kuga, chakan (sedges and rushes), stems and twigs of various bushes, leaves of steppe-grass, etc., according to the surrounding vegetation; no small amount of such material going to form a single nest. A great heap of it is gradually piled up, sometimes to a foot in height and as much as three feet in diameter, on the top of which is the hollow itself. Although the nest is constructed by both parents, incubation apparently falls to the lot of the female alone, although the opinion also exists that during the absence from the nest of the latter the male temporarily takes her place, a view which to me personally seems extremely unlikely. Of course, the lining immediately under the eggs is formed of down from the breast of the female, with which the former are also covered when the parent leaves the nest. During the hatching of her brood by the female, the gander never strays far away, and watchfully guards his future progeny.

The nest of the grey-lag is thus not built in the true sense of the word, but is simply a piled-up heap of all kinds of rubbish, and if there be a trace of structural art in its arrange-

[1] This is frequently the case with some of the ducks.

ment, this consists in the employment of stronger material for the foundation and lighter stuff for the superstructure. In such a nest the female lays from 4 to 12, and even, as a rare exception, as many as 14 eggs. The older the female the greater the number of eggs in her nest; but this, of course, applies only to a certain limit of age, which, owing to the extreme longevity of geese in general, it is impossible to determine.

The following is the table of dimensions and weight drawn up by Mr. Göbel on the basis of 51 eggs of the grey-lag:—

Max. breadth	65.5	mm.	(= 2.57	in.)	and	87	mm.	length (= 3.42	in.)—weight? (European Russia).
Min.	53.5	„	(= 2.10	„)	„	86	„	„ (= 3.38	„)—weight 1524 cgm. (Astrakhan).
Max. length	95.5	„	(= 3.75	„)	„	63.5	„	breadth (= 2.50	„) „ 2352 „ (Caspian Sea).
Min.	79.5	„	(= 3.12	„)	„	57	„	„ (= 2.24	„) „ 1620 „ (Turkestan).
Max. weight	2442	cgm.	with	62	mm.	breadth	(= 2.44	in.)	and 89 mm. length (= 3.50 in.) (Orenburg).
Min. „	1470	„	„	54	„	„	(= 2.12	„)	„ 82 „ „ (= 3.22 „ (Eur. Russia).

Mean breadth 60.3 mm. (= 2.37 in.); max. breadth 65.5 mm. (= 2.57 in.); min. breadth 53.5 mm. (= 2.10 in.).
„ length 88.2 „ (= 3.47 „); „ length 95.5 „ (= 3.75 „); „ length 79.5 „ (= 3.12 „).
„ weight 2002 cgm.; „ weight 2442 cgm.; „ weight 1470 cgm.[1]

The shell is rather smooth, and the colour white or creamy or sometimes greenish white; but, on the whole, they are very like the eggs of domestic geese. Radde's statement, that the shell is sometimes coarser and rougher, at others smooth,[2] is probably founded on wrongly determined eggs collected by natives.

According to Severtsov, many grey-lags breed in the Voronezh Government (up to 1853); they lay in April, the young becoming fledged between July 15 and August 20.

These dates may be regarded as normal for the whole of the central zone of Russia and Europe generally; but farther north the later the geese lay—the eggs, for example, in Lapland not being laid till May.

On the Burani Islands, in the Caspian, eggs were found on April 18, which, according to Dr. Radde, had already been incubated about a week, and consequently must have been laid early in April. In Persia these geese lay still earlier. The time of hatching is usually stated at 28 days.

It would be interesting to ascertain whether the quantity of down in the nest diminishes as the breeding-grounds approach the south, as has been observed in the case of certain species of ducks.

It is, however, probable that this is so, since it is evident, for example, that in the case of geese breeding in the north, sometimes in almost winter conditions, when snow lies all round, it is necessary that the eggs should be covered more warmly during the absence of the female from the nest than in more southerly climates.

Let us now suppose the 27 to 28 days to have passed, and the goslings, covered with short but thick down, to have broken out of the eggs. Although, according to some observers, on leaving the egg the goslings still remain in the nest several days[3] before their mother takes them to water, we have grounds for thinking that this is not quite true, and that they take their first bath not later than one day after birth. Again, it may be admitted

[1] Taczanowski gives the dimensions of eggs of the grey-lag from Dauria, as breadth 58–59 mm., length 79.6–89 mm., so that these eggs are much inferior in size to European specimens.

[2] *Sibir. Reise*, ii.

[3] Thus Vavilov in his *Okhota v Rossii*, iv. p. 39

that the warmer the climate the sooner after leaving the egg do the goslings make acquaintance with water. At first the young birds nip off the tender tops of various water-weeds projecting above the surface, but the mother soon tries to lead them away to a green bank or an island, where they begin to graze in the fashion they will follow for the rest of their lives. Towards nightfall the brood returns to the nest, where the young are kept warm under the wings of the mother. Such is the daily life of the young brood until the goslings have grown so large that they cannot find room beneath their mother's wings; but even after this they still pass several nights huddled close to her body. The brood usually goes to feed in the following order: in front the goose, and in her wake the goslings, crowded closely together; somewhat to the rear stalks the gander, with neck outstretched, constantly turning to one side or the other, and keeping a sharp look-out for any threatening danger or suspicious object. Notwithstanding this watchfulness, in case of actual danger the gander is the first to take wing with a loud cackle, or rather cry, full of fear, leaving the care of saving his children to the female, which, it must be owned, fulfils her duty with complete self-sacrifice. Her first care in the presence of danger is indeed to hide her young wherever possible in the grass or undergrowth, and if there be water at hand the brood will sometimes rush in headlong and seek safety in diving.

If a gosling be caught and removed from the brood, it is said that the mother will fly at the robber and pursue him for a considerable distance. Both goslings and old birds when they wish to hide will lie down flat on the ground, with neck stretched out to its full length; this being the habit of large but not yet fully fledged young birds and moulting old ones, although it is not peculiar to the grey-lag, but common to all geese. In case of the death of the parents, the goslings usually join other broods, and are willingly received by the parents of the latter.

Naumann relates a somewhat strange trait in the life of the grey-lag—namely, that sometimes the geese will fly off with their offspring from a large sheet of water to a smaller one, and back again, without visible cause, but with extraordinary persistence and obstinacy. When they have decided to abandon any particular water, they carry out their intention at any cost, even if all the goslings should perish in doing so. The feeble young in down, when hardly two weeks old, are transferred by the parents to other waters lying within a two or three hours' march across the open fields, or along country roads, past mills, and even through settlements, so that, in such apparently aimless wanderings, the young often perish from the assaults of rapacious foes, or simply from the hardships of the journey. Even if the goslings are caught and reinstated several times on the waters whence the parents had taken them, the latter do not abandon their senseless conduct, but again obstinately carry off their offspring. An attempt has been made to explain such persistency on their part by the instinct of the geese to abandon waters which, according to a presentiment, will dry up in the course of the year; but it is more probable, I think, that the tendency to wander in these birds is caused by the desire to find safer and less accessible spots for the moulting of the old birds—a habit which, as we know, is common to the representatives of the genus *Melanonyx*, and has been described in Seebohm's *Siberia in Europe*. In any case, it must be presumed that one and the same incentive causes the wanderings of grey-lag and bean-geese (*Melanonyx*), and probably other species as well.

Of the first period in the life of the goslings Vavilov gives us a very true picture, which I here quote in full. "At first the goslings eat bog-nuts and various water-plants. They feed at dawn and sunset, and then it is they quit their stronghold and swim out into

the open water. I have often had occasion to observe the geese at this time. The female first shows her head out of the reeds, takes a rapid glance round, listens a moment, and having assured herself that all is quiet, descends with a low cackle to the water; the goslings follow her in a crowd, the gander bringing up the rear. . . . They next come out on the bank, and proceed to satisfy their hunger; but the gander has no time for eating—he snatches a mouthful or two and then listens. No sooner has he noticed something suspicious than he at once begins a low cackle to warn his family; if the danger has passed, he again utters his low note, but now in a different and more soothing tone than at first; in the opposite event, with a loud cry he betakes himself to flight, wholly forgetful of his offspring."

When the goslings are fairly grown up and almost fully fledged, the old birds moult —the ganders somewhat the earlier, and after them the geese,—and, having simultaneously lost all their primary and secondary wing-feathers, they become, like the ducks, perfectly helpless. Knowing this, they duly retire to still safer strongholds, where they pass this dangerous but not very prolonged period of their life.

This precaution does not, however, always save them, and a great multitude of moulting geese, both old birds and partially fledged young, fall into the hands of man.

All the geese which fall to the gun, together with those taken as they alight, are very few compared with the number of fully fledged birds driven into fixed nets, and then taken by hand or killed with sticks or dogs, throughout the length and breadth of Russia and the adjacent countries. It is true that among the number the grey-lag is not the chief or exclusive victim, but this species is destroyed in large numbers, especially if we take into account the widely spread collecting of its eggs in spring.

When the young geese have grown their flight-feathers and the old birds are fully fledged, they begin to fly out to the fields to feed, sometimes in separate broods, at other times in parties; and it sometimes happens that their feeding-grounds are far removed from their places of refuge. In central and southern Russia the flight of the geese to the fields begins about the middle of July.

Severtsov states, for example, that in the Voronezh Government the young birds leave between July 15 and August 20, and, "until the time of their departure, fly first to feed in the oat-fields and then to the young crops of winter corn, in flocks gradually increasing in numbers. Only the migrating flocks present the characteristic wedge. They may be seen throughout the first half of October. The direction of flight is south-west. The migration of these geese coincides with the autumn arrival of *Anser segetum* and *A. torquatus*."[1]

We owe to Vavilov the following life-like description of these foraging expeditions. "A little later the separate broods combine to form flocks; and from this moment the geese no longer fall such an easy prey to the fowler. Such gaggles feed in the corn-fields, especially buckwheat, peas, and oats. Having once selected a field, they constantly fly to it, even continuing to visit it after the harvest to glean the scattered grain. At this period the geese live a life of ease and luxury. With sundown they fly to the field, crowding the crops to an incredible extent, and at the call of the old birds rising heavily and making for the lonely lake to pass the night. They always fly by the same route, and as soon as they reach water at once descend and devote their first attention to slaking their thirst, and then swim to the selected open shore, where they get out, lie down, and fall asleep. The old birds alone do not sleep, but divide the watches, and if they hear anything suspicious,

[1] *Melanonyx arvensis* and *Branta bernicla* of this book.

at once wake the whole flock with a loud cry of warning, and in an instant fly up into the air. . . .

"After a doze of an hour or two, long before dawn the geese on guard wake their sleeping companions, and again the whole flock flies off to the favourite field, where it remains till early morning. Having taken their fill, the geese now fly to another lake, where they pass the day. In the evening they again fly to the field, and so on till their departure."

This description gives a perfectly true general picture of the life of grey-lags until they leave for winter quarters, and I have only to complete it by a few details. Thus, for example, in some cases great rivers with extensive shoals along their banks take the place of the lakes mentioned by Vavilov; and, as regards food, this is considerably more various than is allowed by that observer. Geese feed, indeed, on the grain of wheat, rye, and maize, as well as on chaff or husks, peas, beans, and lentils; but green fields of rye form their favourite food. In the south the grey-lag visits the paddy-fields, which offer such attractive feeding-grounds for many waterfowl and for different waders, on account of the abundance of animal food.

According to some authors, geese do not relish vetches, which are reputed to be harmful to them. Acorns they consume very eagerly, and they are also not averse to feed on all kinds of kitchen-garden plants, and in particular their juicy roots. They eat turnips and potatoes. Young goslings are very fond of water-weeds, such as *Lemna*, *Festuca fluitans*, etc., while on the seashore when wintering grey-lag readily devour *Zostera maritima*, the favourite food of all geese and ducks. Undoubtedly, young goslings eagerly swallow all kinds of insects, leeches, and small crustaceans that fall in their way.

Sitting on the water, geese obtain food from a small depth either by immersing the whole neck or the fore part of the body, taking up a position perpendicular to the surface of the water, after the fashion of surface-feeding ducks, so that only the hind half of the body and the tail is exposed. Very often, to facilitate digestion, they fill their crops with coarse sand, and even with black earth. The droppings of grey-lag geese are very hot, and dry up the grass for a considerable distance around. These droppings and the scorched grass often betray the feeding-grounds of the geese to the fowler.

As winter approaches, little by little the geese begin to move south, with the exception, of course, of resident birds, which never change their abode.

The flight of geese is either continuous and uninterrupted, or gradual, with more or less prolonged halts at convenient feeding-grounds. In general the autumn movement from cold to warm countries is much slower than the spring flight, effected as a rule rapidly, often without stopping, till the breeding-grounds are reached.

Before noticing the grey-lag's winter quarters, a few words may be devoted to its cries. The goose's cackle is more or less well known to all, but only the fowler who has seen and shot many of these birds is able to distinguish with certainty one goose from another by its cry alone. As to the question whether it is possible to express these different cackles on paper, since I have already more than once denied this in my *Utki Rossii*, I must again do so here. In confirmation of the impossibility of representing the goose's call by letters, I cite the following example. Personally I hold that the grey-lag utters on the wing the sounds *gaga-gaga-gaga*, just as is done by the bean-goose (*Melanonyx arvensis*); but English authors often express these sounds as *houk-houk*, the Germans as *kaahkakak*, *kahkak*, *kakakahkak*. Which is right? Of course all depends here on the intonation and

quality of the sound with which these syllables are pronounced. The loud cry of alarm of the grey-lag is very distinct from its quiet cackle on the wing or its low converse with its mate, or, finally, the thundering cackle of a large flock. On the whole, the individual loud cries have a trumpet-like metallic sound, which defies even approximate expression. To recognise the note of the grey-lag, even from afar, is, however, not difficult, and it cannot be confused with any other bird's cry.

Assuming the geese to have arrived at their winter quarters, we may now discuss how they pass this dull time in their lives. For this purpose we may take the following excellent description by Mr. Zhitnikov of the wintering of geese on the river Atrek in the Transcaspian territory: "As regards the winter mode of life of the grey-lag, it presents the opposite of that of the lively, active, lesser white-fronted goose (*Anser finmarchicus*). As the latter is regular in its habits, so the wintering grey-lag is languid and inactive, and the character of its life in this period is not clearly ascertainable on account of the lack of system and order. Until the appearance of the inundations of the aryks (irrigation canals) the geese pass whole days in dense growths of reeds, surrounded by quagmires, and inaccessible alike for man and beast; only rarely do individual flocks wander about the steppe or in the paddy-fields, without any periodicity in time. As soon, however, as the land becomes overflowed, the geese return and spend whole days there, sometimes remaining for the night and sometimes returning to the reeds for the sake of a change. In spring their mode of life is somewhat more regular. Among many specimens of ordinary size and weight there occurred at times remarkably large representatives of the Asiatic grey-lag (*Anser cinereus rubrirostris*[1]). The weight varied between 7 and 12 pounds."

According to Dr. Radde, between September and March the grey-lags keep in great flocks on the Sivash, feeding on the steppe, and flying thence to the ice-free waters of the Samir and Kara-sa; but excessively deep snow compels them sometimes to abandon the Sivash, as happened in the year 1853.

It is very probable that the geese Kessler was told of, as wintering in the Crimea in the Sheikhlar Gulf, belong partly to this species. Personally, although there is no direct evidence of it, I have no doubt that, driven back by foul weather, cold and snow, the grey-lags migrate from the Sivash and the Crimea generally to the southern shores of the Black Sea, which must be crowded with other species also, especially the lesser white-fronted and the red-breasted goose.

It would be unpardonable not to quote here the excellent observations of Mr. A. O. Hume on the winter life of grey-lag in India, the more so that they contain some details which I have purposely omitted in order to avoid repetitions, of which even so the present work has its share. I have ventured to somewhat abbreviate Mr. Hume's sketch.

"This species rarely appears in Upper India before the last week in October, and farther south the first week in November is, I think, the earliest time for their arrival. In some years they are a good week or ten days later. Everywhere many, I believe, leave the country during the first week in March, . . . and I have shot them once as late as April 10. . . . Where geese are much shot at, they feed in the meadows and fields exclusively during the hours of darkness, but where comparatively unmolested, you will find them

[1] I have already stated above that size is no distinctive character of the Asiatic form, and that in Europe geese are met with of greater size and weight than in Asia.

grazing in the young wheat till 9 o'clock in the morning, and back again at their pastures by 4 P.M.

"When not out feeding they spend their time dozing or dawdling about on the margin of some lake or the bank of some river, always by preference choosing some island in these for their noontide siesta. Unless disturbed, they very rarely take to the water; where you see a flock swimming about in mid-stream of one of our larger rivers, or in the open water of some broad, between the hours of ten and three, you may generally safely conclude that they have been recently fired at, or frightened in some way.

"They feed exclusively, so far as my experience goes, on tender shoots of grass, young corn, and other spring crops, and on grain of all kinds—gram, when nearly ripe, being a great attraction to them. Generally, they are pretty well on the alert when feeding inland, but in parts of the country where the people have no guns, and there are no native or European sportsmen about, they get very bold; and when put up at one end of a field, flutter lazily away and settle a couple of hundred yards away in another field, and give the cultivators a good deal of trouble, since three or four hundred of these birds will clear off an incredible amount of grain in a morning. In such localities you may with a common blanket, donned native-fashion over head and body, walk up to within thirty yards of a flock, and then judiciously startling them get a couple of effective shots into the mass as it rises. In such cases never fire until they have risen, and are about the level of your face. A shot on the ground, amongst the crops, with an ordinary twelve-bore, may yield three, generally only two, often only one; the same shot fired when the flock is on the wing, and about your level, will account for from five to eight. I have often got ten, and once or twice more, with two barrels in such cases.

"Where, however, they have been once thus shot at, you will not get near them again for some time without further precautions, but even when on the alert you may often stalk them behind a horse and get to within forty or fifty yards. In such cases it is best to make sure of your one or two birds on the ground with the first shot, as you will seldom have time for more than one shot after they rise.

"Although they rise rather awkwardly and slowly, with violent and noisy flappings of their wings, they fly very strongly and easily when once well off, and I do not know a more beautiful sight than the sudden and rapid descent of a large flock from high in the air to some sandbank. The flock comes along in sober state, circles round decorously once or twice, and then suddenly, as though all hands had been piped to skylark, down they come with incredible rapidity, twisting and turning, with an ease and grace for which no one could at other times have given them credit. They swim well, no doubt, and dive when hard pressed fairly well, though they cannot keep long under water. . . .

"When moving any considerable distance they fly high, and usually in a single line, or in a >, with the point foremost; but when merely changing ground they often fly in an irregular flock.

"They are met with in parties of all sizes, from a single pair to more than a thousand, but flocks of from thirty to a hundred are most commonly seen in Upper India. All our geese prefer rivers to tanks and lakes, but of all the species the grey-lag is least rarely seen about these latter."

Of crosses in the wild state between the grey-lag and other species I know nothing, but that the wild bird breeds freely enough with its domesticated relations is well known. Tame grey-lag pair with domestic Chinese geese (*Cygnopsis cygnoides*), and also with white-

fronts kept in confinement, which should not cause surprise if we bear in mind what unexpected and yet undoubted crosses are met with between ducks of different breeds.

In conclusion, I venture to state that I find a great analogy between the grey-lag and the other geese on the one hand, and the mallard and the other ducks of Eastern Europe on the other.

Thus, the geographical distribution of the grey-lag and that of the mallard in Russia are very similar. Both birds only in rare cases pass the Arctic circle to breed; both are found nesting almost throughout the whole of the Russian territory, and breed everywhere down to the southern boundary of their range; and, finally, the two are respectively the wild ancestors of our domesticated geese and ducks.

Mr. F. Coburn, in his article in the *Zoologist* for February 1903, p. 46, when endeavouring to prove that *Anser rubrirostris*, Swinhoe, is a distinct species, and that this bird strays to Great Britain, is scarcely convincing; and I think I have made quite clear in the present section that this so-called species has no existence.

THE WHITE-FRONTED GOOSE

Anser albifrons, Scopoli

Plate 4

English—*White-fronted Goose*; *Laughing Goose*; *Tortoise-shell Goose*; *Barred Goose*. In North America: *Harlequin Brant*; *Pied Brant*; *Prairie Brant*; *Speckled Belly*; *Speckled Brant*; *Brant*. In California: *Yellow-legged Goose*; *Grey Brant*.

Russian—*Kazárka* and *kozárka*; *belolobaya kazárka* (and *kozárka*); *beloloby gus* (book name); *kazará* and *kozará* (collective); *dikaya guska*; *gusarka* (Kharkov gov., *teste* Somov); *pleshan* (Turukhansk); *pleshivka* and *lysushka* (Perm. gov.); *garkávy gus* (*teste* Pallas, in Little Russia); *kargárka* (on Dnestr., acc. Brauner[1]); *gus kazanok*? (Artsybashev).

Yakut—*Lynglyúga* or *Lynglýya* (on Boganida, Lena, and Vilyui).

Samoyed—*Seer grün* (on Kolguev, *teste* Trevor-Battye); *Syatýko* and *dyontengya* (on Taimyr).

Kirgiz and Bashkir—*Kara-kaz*.

Vogul—*Lyak*.[2]

French—*Oie rieuse*; *Oye rieuse* (Buffon); *Oie à front blanc*.

German—*Blässgans*; *Mittlere Blässengans*; *Weisstirnige Gans*; *Lachgans*; *Lachende Gans*; *Polnische Gans*; *Helsinggans*; *Wilde Nordgans*; *Seegans*; *Trappgans*; *Kolgans*.

Note.—Since, after a full consideration of the question whether the eastern form of white-fronted goose is distinguishable from the western, I have come to the conclusion that it is not, I unite them under one name—*Anser albifrons*.

Below, after describing the different ages of these geese, I give the distinctive characters on which was founded the variety *Anser gambeli*, which I at any rate do not recognise. I accordingly cite the literature and synonyms, referring to these two forms, together.

Branta albifrons, Scopoli, Ann. I., Hist. Nat., p. 69 (1769).
Anser casarka, Gmelin, Reis., ii. p. 177, pl. 13 (1774); Gmelin, Putesh., ii. p. 144.
Anas albifrons, Latham, Gen. Suppl., i. p. 297 (1787).
Anas septentrionalis sylvestris, Brisson, Orn., vi. p. 269 (1760).
Anas albicans (errore), Gmelin, Syst. Nat., ii. p. 516, No. 76 (1788); Bechstein, Orn. Taschenb., ii. p. 454, No. 38 (1803).
Anas erythropus, Wahlberg, Schrift. Berl. Ges. Naturf. Fr., viii. pp. 75-91 (1788); Linn., Syst. Nat., i. p. 197 (*partim*) (1776).
Anas albifrons, Bonnaterre, Encyclop. Méthod., i. p. 114 (1790); Bechstein, Gemein. Naturg. Deutschl., 2nd ed., iv. p. 898 (1809); Ménétriés, Cat. Rais., p. 56 (1832); Naumann, Vög. Deutschl., xi. p. 351, pl. 289

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[1] Evidently some of these names are given to the lesser white-front, where they are not distinguished.

[2] The other native names quoted by Pallas for his *A. erythropus* I refer to the lesser white-front, under which head the reader will find them.

(1842); Middendorff, Reis. Ost.-Sib., ii. p. 227 (1853); Radde, Reis. S.-O. Sib., ii. p. 358 (1863); Nordmann, J. f. Orn., 1864, p. 376 (Fennia); Degland and Gerbe, Orn. Europ., ii. p. 483 (1867); Shelley, Birds Egypt, p. 280 (1872); Severtsov, Vert. Goriz. Turk. Zhiv., pp. 70, 149 (1873); *id.*, Period. yavl. Zh. Zhiv. Vor gub. (1855); Radde, Ornis. Cauc., p. 444 (1884); Zarndny, Orn. F. Orenb. kr., 224 (1888); *id.*, Dopoln. Orn. F. Or. kr., p. 107 (1897); *id.*, Orn. F. Zakaspiisk. kr., p. 438 (1896); Göbel, Vög. Kreis. Uman, p. 207 (1879); Sabaneev, Ukaz. St. Okh. Zool. Sod., pp. 455-458 (1883); *id.*, Prolet Gusei, "Zh. I. Ob. Okh.," 1874, i., ii.; Brauner, Zam. o Pt. Kryma, p. 23 (1893); *id.*, Zam. o Pt. Khers. g., p. 70 (1894); Palmén, Notiser pro F. Fennica, xiv., 1875, pp. 353-355; Artsybashev, Bull. Soc. I. N. Mosc., 1859, iii. p. 100; Yakovlev, Bull. Soc. Mosc., 356 (1872); Eversmann, I. Or. kr., iii. p. 556 (*partim*) (1866); Kessler, Russk. Orn., p. 370 (1847); Menzbier, Pt. Ross., i. p. 734 (1895); *id.*, Promysl. Pt. Ross. i Kavk., p. 46 (1902);[1] Nordmann, Faune Pont., pp. 285-286; Maak, Amur, Prim., p. 144 (1859); Menzbier, Orn. Tulsk. g., p. 84; Sabaneev, Bull. Soc. Mosc., 1871, ii.; Ukhtomsky, Novaya Zemlya (1883), pp. 28-32; Finsch, Verh. z.-b. Ges. Wien, 1879, p. 260; Pleske, Th., Vög. Kola Hlbns., p. 244 (1886); *id.*, Obz. Mlekop. Pt. Kolsk. poluostr., p. 346 (1887); Büchner, Pt. Spb. gub., p. 513 (1884); Büchner and Pleske, Beitr. Orn. S. P. G., No. 178 (1881); Nikolsky, Pozvon. Kryma, p. 289 (1891); Radde, Bull. Soc. Mosc., 1854, iii. p. 160; Radde, "Vestnik Yestestv. Nauk," 1855, pp. 512, 629; Palmén, Caban. J. f. Orn., xxiv. p. 53 (1876); David and Oust., Ois. Chine, p. 492 (1877); Dresser, Birds Eur., vi. p. 375, pl. 414 (1878); Sclater, Pr. Zool. Soc. Lond., 1880, p. 500; Coues, Check-list, 2nd ed., p. iii. No. 692 (1882); Seebohm, Hist. Brit. Birds, iii. p. 505, pl. 60 (egg), 1885; Shatilov, Bull. Soc. Mosc., 1860, iv. p. 513; Bogdanov, Pt. Zver. Povolzh., p. 147 (1871); Hume and Marshall, Game Birds India, iii. p. 73 (pl.) (1879); Shatilov, "Izv. Ob. Lyub. Yestestv.," x. 2, p. 94 (1874); Przewalski, Put. Uss. kr., 1870; Kholodkov. i Silantiev, Pt. Yevr., p. 523, pl. 42 (1901); Silantiev, Opred. Yevr. Pt., p. 112 (1901); Trevor-Battye, Ice-bound on Kolguev, p. 207 (*pullus*), p. 423 (1895); Somov, Orn. F. Khark. gub., p. 446 (1897); Ridgway, Man. N. Am. Birds, p. 116 (1887); Gigl. and Salvadori, Pr. Zool. Soc. Lond., 1887, p. 589 (Korea); Salvadori, Cat. Birds Brit. Mus., xxvii. pp. 92-97 (1895); Oates, Man. Game Birds India, ii. p. 48 (1899); Buturlin, Dikie Gusi Ross. Imp., "Psov. i Ruzh. Okh.," Feb.-Apr., 1901; *id.*, separ., pp. 13-16; *id.*, Sinopt. tabl. Okh. Pt. Ross. i., p. 45 (1901); *id.*, Tabl. Opred. Plastinchatokl., "Psov. i Ruzh. Okh." (1900); Palmén, Bidr. Sib. Ishafsk. Fogelf. Vega Exp., p. 415; Chapman, The Art of Wildfowling, 1896 (*pro parte*); Ruzsky, Sist. sp. Pt. Kaz. g. (Trud. O. Yest. pr. un., xxv. pt. 6, p. 114 (1893); Sushkin, Pt. Uf. gub., p. 68 (1897); Deryagin, Put. dol. Obi, Trud. I. Spb. Obshch. Yestestv., vol. xxix., pt. 2, 1898; *id.*, Orn. izsl. Pskov. g., Tr. I. Spb. Obshch. Yest., vol. xxvii. pl. 3 (1897); Johansen, Nauch. Ocherki Tomsk. kr., 1898, O ptits., p. 65; Finn, How to Know Indian Ducks, p. 18 (1901); Chapman, Bird Life of the Borders, p. 212 (1889); Sharpe, Second Yarkand Miss. Aves, p. 128 (1891); Payne-Gallwey, Letters to Young Shooters, 3rd Series, *pro parte*; Audubon, Orn. Biogr., iii. p. 568 (1835), pl. 186, ♂ ♀; Seebohm, Birds Jap. Emp., p. 237 (1890); Cordeaux, British Birds, Nests, Eggs, pp. 13, 58, with plate (1896); Pearson (*pro parte*), "Beyond Petsora," 1899; Khomyakov, Pt. Ryazan. gub., 1900, p. 33 (iz mater. F. i Fl. Ross. I., Otd. Zool., pl. 5); Coburn, Zoologist, 1902, p. 337 *et seq.*

Anser erythropus, Fleming, Brit. An., p. 121 (1828); Fritsch, Vög. Eur., p. 404, pl. 45, fig. 9 (1870).

Anser medius, Bruch, Isis, 1828, p. 732; Brehm, Naumannia, 1855, p. 297.

Anser bruchi, Brehm, Isis, 1830, p. 996 (*nom. nudum*); *id.*, Vög. Deutschl., p. 841 (1831); Fritsch, Vög. Eur., p. 405, pl. 45, fig. 5 (1870).

Anser intermedius, Naumann, Vög. Deutschl., xi. p. 340, pl. 288 (1842); Somov, Orn. F. Khark. gub., p. 447 (1897) (*certe, sec. descr., juv.*).

Anser gambeli, Hartlaub, Rev. et Mag. Zool., 1852, p. 7; Seebohm, Birds Jap. Emp., p. 237 (1890); Buturlin, Zametka o nekotorykh ptitsakh Liflyandskoi gub., Dnevn. Zool. Otd. I. O. Lynb. Yest., vol. iii. No. 3, p. 4 (1902); Coburn, Zoologist, 1902, p. 337 *et seq.*

Anser albifrons var. *gambeli*, Coues, Key N. Amer. Birds, p. 282 (1872); Baird and Ridgway, Water-Birds N. Amer., i. p. 448 (1884).

Anser frontalis, Baird, Birds N. Amer., p. 562 (1858).

Anser albifrons gambeli, Ridgway, Pr. U.S. Nat. Mus., 1880, p. 203; Stejneger, Bull. U.S. Nat. Mus., No. 29, pp. 145-317, pl. iii. fig. 2 (*caput*); Taczanowski, Faune Orn. Sib. Or., p. 1091 (1893); Ridgway, Man. Birds N. Amer., p. 116 (1887); Stejneger, Ornith. Expl. Com. Isl. and Kamtsch., p. 145 (1887).

? *Anser albifrons roseipes*, Schlegel, Naumannia, 1855, pp. 254, 256, 257.

? *Anser pallipes*, Selys-Longchamps, Naumannia, 1855, p. 264 (var. *domestica*); Degl. and Gerbe, Orn. Eur., ii. p. 485 (1867).

? *Anser albifrons a pallipes*, Bonaparte, Compt.-Rend., xliii. p. 648 (1856).

? *Anser brachyrhynchus*, Swinhoe (*nec* Baillon), "Ibis," 1875, p. 456; Seebohm, Birds Jap. Emp., p. 236 (1890).

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[1] The figure in plate 133 of this work cannot, I think, refer to this species, but represents a young *finmarchicus* with abnormal colouring of the legs.

Adult Male

Head and neck brown, colouring on cheeks and throat somewhat lighter than on crown and nape; forehead and feathering along base of upper mandible and terminal part of feathering of chin white, the latter being at times entirely white, but rarely without any white at all, the difference being apparently unconnected with either sex or age. Width of white blaze on forehead, which may vary in different individuals, *only in very rare cases reaches the line joining anterior angles of eyes*; in the vast majority of cases, however, the white ceases considerably short of the above-mentioned line. On the whole, this white patch on the forehead seldom has a breadth posteriorly of one inch (=25.4 mm.), as, for example, is the case in a specimen from Livonia.[1] White on forehead and sides of base of upper mandible bordered behind with black, or, more seldom, blackish, gradually merging behind into brown colouring of head.[2] Whole of back and scapulars, as also tertiary wing-feathers, dark greyish brown with whitish grey edgings. Rump dark brown or blackish; upper tail-coverts white; tail-feathers, sixteen,[3] greyish brown with white edges and tips.[4] Anterior part of breast pale ashen grey with lighter edges to feathers; belly whitish, with more or less numerous and variously sized black patches, which in perfectly adult (probably even very old) specimens develop so much as to cover almost whole surface save hindmost part, which, like the vent and all the lower tail-coverts, is pure white; flanks brown, with broad pale edgings to feathers.

Upper lesser wing-coverts greyish brown; median and greater brown, with broad white tips. Lower wing-coverts and axillaries dark greyish earthy colour. Outer primaries and secondaries entirely brownish black, secondaries with narrow greyish edgings; shafts of all primaries and secondaries, with exception of dark tips, white.

Here I consider it necessary to state that in the intensity of its general brown colouring this goose is just as liable to individual variations as is the grey-lag (*Anser anser*); at the same time, so far as I can judge from the material examined, such variations are not dependent on either sex or age.[5] Generally speaking, in all the geese individual variations in colouring are considerable, and in the case of the pink-footed goose I point out that, even in the young in down from one nest, the colouring shows considerable differences between one specimen and another.

Adult Female

Differs, apparently, in no respect from the gander as regards colour, but is on the whole somewhat inferior in size. I therefore quote the dimensions of the white-fronted goose, without stating the sex; this being the less to be regretted, seeing that it did not seem possible to give the limits for the maximum measurements of the female, on account of the inadequate material.

I may also direct the attention of the reader to the fact that, although in the extreme east of Russia individuals occur exceeding specimens of more westerly origin, yet even there, alongside of larger birds, are to be met with specimens which by no means excel European birds, notwithstanding their complete maturity. The bill in the eastern

[1] Kindly communicated to me by Mr. Buturlin.

[2] Specimens occur in which this black border is very feebly expressed, but oftener it is sharply marked.

[3] Very possibly sometimes rising to eighteen.

[4] Seemingly the white edge and tips of the tail-feathers become wider with the age of the bird.

[5] Here, it seems, the time of year plays some part, as I always found fresh plumage darker and purer than is the case in spring specimens, when the feathers near moulting are battered and faded.

individuals, as is the case in the majority of the other species of geese, is, however, on the whole (though not invariably) more robust. However, I consider there is not sufficient ground to establish a separate race on the basis of such an unstable character; and I therefore regard all these geese from the Far East, such as *Anser albifrons gambeli*, as ordinary white-fronted geese—*Anser albifrons.*

The normal colouring of the bill in both sexes is a very pale whitish flesh-tint (varying of course in depth), locally with a slight wash of blue and with yellow (orange) edges to the nares, and with a median longitudinal streak on culmen (between nares), and the basal part of rami of lower mandible of same colour. Nail white (rarely greyish white); the older the bird, the purer being the white. Feet orange, with paler yellow membranes and whitish claws; but sometimes a pink colour appears on the feet, as noticed by Naumann. This pink or red colour of the feet explains the statement of such a constantly accurate observer as Pallas that *Anser erythropus* (under which name he evidently confused this goose with the lesser white-fronted goose) has " pedes rubri," *i.e.* red feet.[1]

Iris in this species dark hazel or dark chestnut. Ceroma greyish, sometimes with yellowish shade, or brownish grey, but never *either lemon-yellow or orange*, whereby the white-fronted goose at all ages is sharply distinguished from the lesser white-fronted goose, as described below. Dr. Sushkin informs me that in a specimen from the Turgai Territory, which he considers to be a very old female, the edge of the eyelid was *slightly yellowish* and perhaps *hardly perceptibly swollen.* In this specimen the orange tinge on the bill also was more pronounced than usual.

Adult (but not old) Birds

Birds approximately from 3 to 4 years old have only the mental angle white.[2] Yellow spots on bill[3] hardly indicated. Sometimes these spots are blackish (dark slaty grey), and it would seem that such specimens are occasionally quoted by authors as *Anser intermedius*, Naumann; for example, among others, by Mr. N. N. Somov, from the Kharkov Government.

Young Birds in Second Year

These have the white on head far less developed in breadth, and the bill darkish grey, with pink or fleshy shade and dingy greyish or greyish white nail. Black patches on abdomen almost entirely wanting, or extremely small and few.

Young Birds in First Plumage

White feathering on head entirely absent and, both on top of forehead and along base of upper mandible, replaced by black or brown-black. Bill yellow-grey or grey flesh-colour, or grey with lilac tinge, and greyish nail. Feathers of under-part of body much narrower (fully one-third) than in adults, and on upper surface feathers narrower and sharper than in adults, as is apparently the case in all young geese of this age. On light-grey belly (where black patches are always wanting) fairly regularly disposed grey speckles, resulting from the fact that the feathers have grey centres.

[1] It must also be remembered that white-fronted geese kept and bred in confinement often have pink feet (*Anser pallipes*, Selys de Longchamps).

[2] I have already said above in describing the male that sometimes the white is quite absent from the chin.

[3] *i.e.* around the nares, on the culmen, and at the base of the branches of the lower mandible.

Dimensions of Adult Birds

Total length	635–760 mm. (= 24.25–30 in.).
Wing	375–435 mm. (= 14.75–17 in.).
Culmen	40–56 mm. (= 1.57–2.20 in.).[1]
Bill from gape	40–56 mm. (= 1.57–2.20 in.).[1]
Height of upper mandible	23.5 mm. (= 0.90–1.20 in.).
Breadth of upper mandible at base	22–26 mm. (= 0.85–1.05 in.).
Tarsus	51–81 mm. (= 2.25–3.20 in.).[2]

The number of teeth on each side of the upper mandible, so far as I have yet been able to convince myself, is for the most part about 28, and in rare cases 26; but I have not had sufficient material to finally clear up this point.

The weight of these geese fluctuates between 5 and 6½ lbs. More exact data have been given by Mr. Popham in the *Field*, 1903 (January 17, No. 2612), where this author, from 21 specimens, found the maximum weight = 6 lbs., minimum = 4 lbs., and mean 5½ lbs. Seeing that, as we go east, white-fronted geese somewhat increase in dimensions, it is desirable that sportsmen should furnish us with data of the weight of all specimens of this species they may take.

Having regard to the part played hitherto by bill-dimensions in various specimens of the white-fronted goose in dividing it into a western and eastern form, I consider it worth while to cite some of the measurements made by myself from skins obtained from various localities in Russia. Unfortunately, in many cases the sex of the birds was not determined.

Culmen along straight line from forehead to end of nail of upper mandible:—

	♂	48.5	mm. (= 1.90 in.)	Livonia (Buturlin).
Young bird		46	„ (= 1.81 „)	Novaia Zemlia (Nosilov).
Sex	?	45	„ (= 1·77)	Kharkov Government (Somov).
Young bird		43	„ (= 1.69 „)	Shlisselburg (Pleske).
Sex	?	51	„ (= 2.00 „)	? Voronezh Government (Severtsov).
„	?	49	„ (= 1.92 „)	Orenburg region (Eversmann).
„	?	43	„ (= 1.69 „)	Kirgiz steppe (Karelni).
„	?	52	„ (= 2.04 „)	Kamchatka (Voznesensky).
„	?	46	„ (= 1.81 „)	Kamchatka (Voznesensky).
„	♂	52	„ (= 2.04 „)	Kamchatka (Voznesensky).
„	?	47	„ (= 1.85 „)	Japan (Nagasaki) (Polyakov).
„	♂	53	„ (= 2.08 „)	Sakhalin (Suprunenko).
„	♂	44	„ (= 1.73 „)	Sakhalin (Suprunenko).
„	?	52	„ (= 2.04 „)	Bering Island (Grebnicki).[3]
„	?	49	„ (= 1.92 „)	Yezo (Maksimovich).
„	?	48	„ (= 1.88 „)	Chukchiland (Baron Maidel).
„	?	49	„ (= 1.92 „)	Chukchiland (Baron Maidel).
„	?	52	„ (= 2.04 „)	Chukchiland (Baron Maidel).[4]
„	?	46	„ (= 1.81 „)	Chukchiland (Baron Maidel).[5]
„	♂	48	„ (= 1.88 „)	Verkhne-Kolymsk (Father Vasili).
„	?	56	„ (= 2.20 „)	Anadyr (Grinewecki).
„	?	47	„ (= 1.85 „)	Anadyr (Olsufiev).
„	?	48.5	„ (= 1.90 „)	Yakut Territory (Maak).

[1] In American race, i.e. *Anser albifrons gambeli*, culmen sometimes reaches 60 mm. (= 2.35 in.) in length.

[2] Variability in length of tarsus in geese very great, and far from corresponding to length of bill, so that I accord only secondary importance to this measurement.

[3] A young specimen, in which five external wing-feathers of left wing and two external wing-feathers of right are pure white—a very rare feature, it would seem, of partial albinism among geese.

[4] Labelled "*Anser intermedius*."

[5] Labelled "*A. gambeli*," and further, "bill dark colour, on upper surface and near edges slightly orange." Evidently bird came into hands of label-writer some time after death.

The following measurements were made at my request by Dr. Sushkin from specimens obtained from the Turgai district and the Ryazan Government :—

♀ ad.	42 mm. (= 1.65 in.)	Turgai District	(Sushkin)
♀ s. ad.	43 „ (= 1.69 „)	„	„
♀ senior	44 „ (= 1.73 „)	„	„
♂ ad.	48 „ (= 1.88 „)	„	„
♂ ad.	47 „ (= 1.85 „)	„	„
♂ ad.	45 „ (= 1.77 „)	„	„
? ♂	50 „ (= 1.96 „)	„	„
♀	44 „ (= 1.73 „)	Ryazan Government	„

Dr. Sushkin has also sent me bill-measurements of young birds from the Turgai Territory, viz. :—

♂ juv.	40 mm. (= 1.57 in.)
♂ „	41 „ (= 1.61 „)
♂ „	47 „ (= 1.85 „)
♀ „	42 „ (= 1.65 „)
♀ „	38 „ (= 1.49 „)
Sex ? „	40 „ (= 1.57 „)

Summing up these measurements, we obtain the result that white-fronted geese from Novaia Zemlia,[1] Livonia, the Kharkov, Ryazan, and Orenburg Governments, and the Kirgiz steppe (including young birds), have the culmen measuring

	43–49 mm. (= 1.69–1.92 in.)
From Verkhne-Kolymsk	42–50 „ (= 1.65–1.96 „)
„ Kamchatka	44–52 „ (= 1.81–2.04 „)
„ Sakhalin, Yezo, and Japan	44–53 „ (= 1.75–2.08 „)
„ Chukchi Peninsula and Anadyr	46–56 „ (= 1.81–2.20 „)

Consequently, adult birds occurring in Russia have culmen-length 43 to 56 mm. (= 1.69–2.20 in.), the maximum length being 56 mm. (= 2.20 in.) recorded *only in one* specimen which came from the most easterly portion of Asiatic Russia, thus being entirely in accord with the general increase of bills in geese as we proceed eastwards. We see, however, that the other Anadyr specimen and all those from Chukchiland collected by Baron Maidel have considerably shorter bills, one of these, viz. 41 mm. (= 1.86 in.), even yielding to some European examples in size. We have no specimens of Greenland white-fronted geese, but apparently they are rather less than the European form, and cannot be referred to *A. gambeli.*

In North America it is, however, well known that the white-fronted goose sometimes exceeds in the dimensions of the bill even the specimen we have cited above from Anadyr, at times attaining the great length of 60 mm. (= 2.36 in.); but it must be remembered that there also the length of bill of this goose varies from 40 to 60 mm. (= 1.57–2.36 in.)—that is to say, there also often occur individuals not excelling European specimens. Nevertheless, taken all together, it must be admitted that American white-fronted geese are somewhat larger than ours; but in view of the fact that the colouring of the whole bird, and, in particular, of the soft-parts, does not differ from that of ours, I do not know by what characters to distinguish the American specimens which do not exceed the typical geese of

[1] Unfortunately, of the white-fronted geese collected by him in Novaia Zemlia, Mr. Pearson only gives the total length of the birds, but not the bills. They were 25–28 in. (= 635–710 mm.) long, *i.e.* dimensions far from either of the limits.

this species in the dimensions of the bill. If even it be granted that the American form (*gambeli*) must be distinguished from the East Asiatic white-fronted geese, yet the latter at any rate are not distinguishable from the European birds. We shall try to prove this again by entering more fully into the question of the colouring of the bill of this goose. Inaccurate description of the colouring of the bill of the European white-fronted goose has been, perhaps, the main cause for separating from it the American and the East Asiatic birds under the name of *Anser gambeli*.

That the *orange* or *yellow* colouring of the bill was attributed to the European white-fronted goose *from dry bills*—or at any rate from birds that had been killed some time—is beyond doubt. In living or recently killed birds the bill *is probably never either all yellow or all orange*, only separate portions of it being of that colour. The admission that sometimes a white-fronted goose may be found with the bill of abnormal colour may be made, and analogous cases are known among other aquatic birds (*e.g.* grey-lag, mallard), but such a feature would be a conspicuous exception, and it cannot therefore be taken into account. The question of the normal colouring of the bill in the given case is so important that I am compelled to touch upon it in greater detail in order to ascertain once for all what this really is in both the European and the Eastern white-fronted goose described here, and also in that of North America.[1] I will begin with an author whose accuracy hardly any one can doubt, but whose excellent works, for some reason or other, are now more ignored than they should be. I mean Naumann, who describes the bill of this goose as follows: "Colour of entire bill. Usually it is pale and pure yellow-red or orange-red without black, *and this colour passes in old birds through dull flesh-colour to a more or less rosy red, often to a very beautiful rosy tint*; but this colouring is to be seen *only in living specimens, as after death it rapidly turns into orange.*"

Farther on, Naumann states that he saw near Potsdam in a living pair of these geese "*this beautiful rosy colouring also on the feet.*"[2]

The nail is described by the same writer as dingy white or white, passing toward the tip into grey.

"In mature young birds,"[3] continues Naumann, "the bill is reddish ochreous yellow.

"The dingy yellowish or brownish-white nail posteriorly and the sides of the lower mandible have dingy brown markings.

"Within, the beak is somewhat paler than without; the tongue is of a yellowish reddish white or flesh-colour. *After death the colouring of the bill passes from orange to reddish, then becomes darker, and finally, after drying, assumes a whitish horn-yellowish colour.* The nail remains white; the ceroma is reddish yellow or red-grey. The feathering of the outer part of the eyelids is whitish."

From this statement of Naumann's it becomes evident that in the *live birds* seen by him the bill was of a *beautiful rosy* colour, and that after death *it rapidly passed into orange.* From the last phrase it is impossible to avoid the conclusion that if the bill of the living bird were already orange, there was no reason for it to be subjected to any change or transformation in order to *again become orange.*

[1] I am fully conscious that my frequent repetitions and long dwelling on the structure and colouring of the bills of certain geese must be very tiresome to the majority of my readers, but I am obliged to unravel very involved questions which for more than a century have remained undecided, and I cannot do this otherwise than by a careful analysis aimed at substantiating the view expressed by myself on certain species of geese, or my deductions might be regarded as baseless.

[2] Italics mine.

[3] Consequently in their first plumage.

Now, in order to still more clearly explain what I mean, I must refer to a very characteristic phrase used by Naumann, which I cite also in the description of the lesser white-fronted goose, viz.: "*The bill after death and the dry bill change into a light horn-yellow colour, by which it is possible to judge approximately of its colouring during life.*" From this, one may confidently say that Naumann, who had seen living and freshly killed greater and lesser white-fronted geese, considered that we might *approximately judge the colour of the bills of living birds from dry horn-yellow bills.*

Since in the description of the lesser white-fronted goose I deny the existence in that species of an entirely yellow or orange bill, so here also I do the same in regard to the white-fronted goose, on the basis of an examination of Naumann's description, and further draw the conclusion that its true normal colouring is *pale flesh*,[1] *rosy reddish*, or, finally, the *beautiful rosy* colour which Naumann saw in living specimens near Potsdam.

Knowing how many ornithologists have blindly kept in their descriptions to those of Naumann without entering deeper into his statement, and also knowing how later ornithologists have borrowed, at second hand, such descriptions, without taking the trouble to verify the words of the original author, it seems to me perfectly clear that it was from Naumann, and no one else, that arose the description of the *yellow* or *orange* bill of the white-fronted goose, although, as a matter of fact, as I have here tried to prove, this is nowise apparent from Naumann's own description.[2]

From a very considerable number of skins examined by myself belonging to this species and to the lesser white-fronted goose, I have been able to arrive at the conviction that the dry bills are *almost always* of a waxy yellow colour, and that it is hence evidently impossible to judge of the colour of the bill in the living bird.

Let us now see how Messrs. Degland and Gerbe describe the bill of this goose: "*Bill orange-yellow around nares, in middle of upper mandible and along edges of lower; remaining part of bill colour of wine-lees* (*lie de vin*) *with whitish nail.*" That this description is perfectly accurate, at any rate for the great majority of white-fronted geese, is confirmed by the following fact. In September 1901 I had the pleasure of receiving from the author of *Dikie Gusi Ross. Imp.*, Mr. S. A. Buturlin, a packet with the head and foot of a white-fronted male goose, killed in Livonia, September 18, with a letter as follows: "*Feet orange-yellow with pale claws; bill pale milky violet-colour with more whitish nail; basal portion of rami of lower mandible, the extreme edges of the nares, and a narrow strip along the median part of the culmen, orange.*"

This head, preserved in formalin, clearly shows where and how the orange-colour is disposed on the whitish (with rosy shade) ground-colour of the bill; and all this completely coincides not only with the description of Messrs. Degland and Gerbe given above, but with the description of the bill of *Anser gambeli* by various authors. The following, for instance, is what American ornithologists say about the latter: "Bill milky white (becoming flesh-colour some time after death), the interior part and tomia with a very faint rosy tinge, the posterior part with a hardly perceptible wash of bluish; a square figure on culmen, edges of nostrils, a small spot beneath them, and the basal two-thirds of the lower half of

[1] Although the intensity of colouring varies considerably from the afflux or reflux of blood, the fundamental tint yet remains the same, *i.e.* rosy or flesh, between which it is not easy to draw the line.

[2] Just the same thing happened, we saw, with the description of the Siberian grey-lag by Dr. Radde. Not understanding the words of this author, many others transferred the bright rufous colour of the feathering surrounding the upper mandible simply to the latter, thus producing the confusion of which Radde was quite innocent.

the under mandible cadmium-yellow; naked skin on mental angle and corner of mouth of the same colour, but paler" (Stejneger).

According to the kind communication of Mr. Frohawk, the bills of the live geese of this species (probably not quite adult birds) examined by him in the London Zoological Gardens (January 30, 1902) were *pale salmon-pink, nails whitish black and a streak passing through nares, as also legs and feet apricot-yellow, claws white, ceroma greyish.*

Finally, Dr. Sushkin answered my question as to the white-fronted geese from the Turgai district as follows: "*In adult bird, bill in both species* (*i.e.* in greater and lesser white-fronted goose) *beautiful pure rosy red colour, called in English peach-blossom. Intensity of this colour varies, and apparently is connected with the afflux and reflux of blood* (*do not confuse this phenomenon with extravasation, which is only the consequence of a wound in the bill or its neighbourhood*); *sometimes the bill may be very pale. In the lesser white-fronted goose I have not seen orange colouring on bill. In* A. albifrons *it appears on bridge of nose* (*between nares*), *at base, and laterally on rami of lower mandible and about nares. This colouring is always very ill defined. Perhaps traces of it are constantly present, but it becomes visible only in consequence of the reflux of blood, from which the rosy ground colouring fades.*"

These descriptions are in such agreement, that if we add to their evidence that of Naumann's drawing (*Vög. Deutschl.* pl. 289), representing the bill of *A. albifrons* just as it is described by Messrs. Degland and Gerbe, Buturlin, Frohawk, Sushkin, and Ridgway, no doubt remains but that in both the European and the American white-fronted goose the bill is *normally* coloured the same, and an orange or yellow bill only occurs in dry skins or perhaps, as an exception, *in very fat examples*, when a layer of subcutaneous fat covers the whole area of the bill.

To finish with the colouring of the bill in the white-fronted goose, I may here quote the following description from Professor Menzbier's *Ptitsy Rossii*, vol. i.: "In adult bird bill *orange-yellow* with whitish nail" (p. 738), and farther on (p. 739), "in regard to colouring of bill, white-fronted goose *comes nearest of all to grey-lag.*" In the article on the latter (*l.c.* p. 755) we read that "its bill is *flesh-colour with white nail.*" This last indication, which is perfectly true, does not agree in the least with the orange-yellow colouring given by the author on p. 738. At the end of the present book I quote, with the author's permission, Mr. Buturlin's account of his journey to Kolguev in 1902; at the very beginning of which he speaks of fresh-killed white-fronted geese, and describes their bills exactly as they appear in my own description.

Although I have perhaps dwelt too long on the question of the true colouring of the bill of the white-fronted goose, I fear that I have yet not sufficiently clearly expressed my meaning. This, then, is that neither orange nor yellow occurs normally as the entire colouring of the bill in *A. albifrons*, and that there is *no difference whatever* between the colouring of the bill in the latter and that of the American *A. gambeli.* Accordingly a somewhat greater size of beak is the sole distinguishing character of the American form, and that only as a rule or in extreme cases, but nowise universally.

Geographical Distribution

The present is not the first time that I have had occasion to unite certain forms of geese regarded by the majority of ornithologists as distinct. I have indeed been compelled

to do so with the European and the Asiatic representatives of the grey-lag, with the ordinary lesser white-fronted goose, and finally with the European and the Asiatic white-fronted geese.

By this amalgamation, the question of the range of the present species is considerably simplified, and may be expressed in general terms as follows: *A. albifrons* nests in limited numbers[1] in Finmark and, on the testimony of Göbel, in Lapland. The following is what the latter well-known oölogist and ornithologist has written to me on this subject: "For reasons which are not quite clear to me, an opinion exists that *A. albifrons* is not met with breeding in Lapland. I do not share this view, but hold that *A. albifrons*, regularly or sporadically (of this I cannot judge), nests in Lapland, at any rate near Notozero. In 1897 Laps brought to the Kola forester Auwikaine, now deceased, two young geese from that locality, not quite mature. I saw them at his place in the winter of 1899 when they were almost three years old. The female proved to be a typical *Melanonyx arvensis*, with short bill marked by a yellow ring; the male, on the other hand, was *A. albifrons*, with, however, a remarkably narrow streak of white on the forehead and around the base of the bill. The birds were of similar size. In the spring of 1898 and 1899 these geese paired, but the female laid no eggs."[2]

The species also breeds in the Kola Peninsula, in the region of the Varanger Fjord, in large numbers in Novaia Zemlia,[3] in Kolguev, and in the Kaninsk Peninsula, in the basin of the Obi, from its delta descending south to Berezov, in the Taimyr Peninsula, on the Yenisei (where Mr. Popham found old birds, eggs, and young in down), and over the whole of the extreme north of Siberia to Chukchiland inclusive. Whether the region of its nidification is a continuous zone or with interruptions, the present extremely scanty data do not admit of determining, and it is also impossible to determine even approximately the southern frontier of the breeding-grounds of this species in Siberia. Like the lesser white-fronted goose, this is pre-eminently a bird of the far northern tundra, and probably of the majority of the islands lying along the whole shore of the Arctic Ocean of the East Asiatic continent; Dr. Bunge having found it in 1866 on Lyakhov Island.

The statement of the Russian sportsman, the late L. P. Sabaneev, that the breeding-grounds of the white-fronted goose descend, in the Perm Government, as far south as 57° N. lat., is refuted by Professor Menzbier.

It must, however, be remembered that Eastern Russia is still extremely ill explored, and that what now seems to us so little credible in the distribution of various animal forms there, may very easily prove perfectly true. It is a sad confession, but the distrust of our knowledge of Russia's fauna becomes stronger the more closely it is studied.

The white-fronted goose also breeds in Greenland, Iceland, and throughout the Arctic part of North America; in the latter as the longer-billed form now distinguished under the name *A. albifrons gambeli*.

On migration the white-fronted goose is met with not only in all European and Asiatic Russia, but throughout Western Europe, wintering locally in Great Britain, Belgium, Holland, and in the whole Mediterranean basin. It also winters in vast numbers in Egypt, where, as Captain Shelley states, it is the predominating goose,[4] as well as in the basins of

[1] So far as known; but perhaps in considerable numbers.

[2] Unfortunately, subsequently, in the absence of G. F. Göbel, who did not succeed, as he had intended, in taking their dimensions, they were eaten by their unscientific mistress.

[3] By Pearson found both in Lüdtkeland and in the southern part of the island.

[4] Presumably this species was the domestic goose of ancient Egypt, as its portrait is found on the walls of ancient temples, where it is represented as being fed by men.

the Black and Caspian Seas, in North India, China, Korea, and Japan. As to Transcaucasia, and even the lakes of the Armenian highland, I have a curious fact to communicate. I have myself seen white-fronted geese shot near Tiflis, but for some reason local sportsmen, to my great surprise, there consider them as almost uneatable, while in the Azov region this goose is highly esteemed as a table-bird—an opinion with which I am quite in accord, as I have often had occasion to use them as food, and have also heard the most favourable accounts of their excellence from all the inhabitants.

As regards the American representative of this goose, it is known that, while migrating through the whole country, it travels to winter as far south as Mexico and Cuba.

While, then, we know approximately both the summer and winter habitats of the white-fronted goose, and have seen that it is met with on passage almost throughout Western Europe and in European Russia, yet we are unable to give detailed data on its lines of migration owing to the lack of observations. I consider indeed that, with the data to hand, it would as yet be hazardous to define even approximately these lines, especially in view of the fact of the frequent confusion of this species with the lesser white-fronted goose, from which it is far from always possible to distinguish it with certainty when on the wing. Many such determinations are made, so to say, by eye; but, for birds which not all ornithologists could certainly distinguish even by their skins, such determinations from a distance can have absolutely no real value, and may easily still further complicate the question. As regards facts, it is undisputed that in many parts of Asia white-fronted geese are very rarely seen on migration. In the Turgai district, for example, these geese were obtained by Dr. Sushkin, between September 20 and October 4, on two lines of migration: one of these being in the extreme northerly corner of the territory, the other midway between the upper waters of the Tobol and the Emba. In Turkestan it is rare, as it is in North Mongolia. In Central Asia Przewalski, for some reason, nowhere mentions it; but in the Ussori district white-fronted geese are numerous when migrating, as is stated by the same explorer in his description of their passage over Lake Khanka.

According to the Abbé David, this goose passes in great numbers along the coast of China, and, although in winter not plentiful in the markets of Peking, is very abundant at that time of year in those of Shanghai. We do not, however, know much about its winter quarters; although, on the other hand, we are aware that in several localities where it might be supposed to winter it is not met with. For instance, let us take the valley of the Atrek, where Mr. Zhitnikov observed such a vast number of lesser white-fronted and red-breasted geese (the latter on passage from Persia), although he did not see a single specimen of the white-fronted goose, whereas not very far distant, on the Caspian Sea and in Transcaucasia, these geese winter in large numbers. There seems, moreover, no doubt that they pass the winter on all the shores of the Black Sea, *i.e.* in suitable spots of the Western Caucasus and on the Asia Minor coast; but, unfortunately, these places remain to this day no better explored than many far more distant localities in Russian territory. The wintering of the species in the Crimea in large numbers is testified to by Dr. Radde (Sivash) and other investigators. It arrives there at the end of September and remains till March, but in hard winters only till December, as it retires from severe frosts, doubtless, to the warm coasts of the Caucasus and Asia Minor. Countless hosts of these birds pass in autumn

through the Azov district, along the lower course of the Don; and there is little doubt that these flocks leave to winter on the Black Sea, while a part may even journey to North Africa, although none make for the Caspian. In warm autumns these geese remain long about the Azov, frequenting the estuaries of rivers and the rich green crops of the adjacent steppes. Their loud, cheerful *kha-kha* or *gaga-gaga*, really at a distance resembling laughter, is then heard ceaselessly in those regions; but it must always remain a wonder whence such innumerable flocks of geese can have come! True, my recollection of such hosts of white-fronted geese refers to the past,—seventeen to twenty years ago,—but they undoubtedly assemble there now in the autumn in large numbers. Notwithstanding such abundance, the number killed is far from great. Only one autumn I remember, on the estuary of the Mius, some twelve miles from Taganrog, that two brothers, professional wild-fowlers, whom I knew, shot no less than some 400, owing to the fogs then prevailing, during which the geese flew from their night refuge to feed in the steppe and back again, keeping very low. In the Kharkov Government, on both passages, this species, according to Mr. N. N. Somov, is the most common of all geese.

That white-fronted geese do not always travel autumn and spring by the same routes is certain. For example, in the Azov district, where such masses of them fly past in autumn, their spring migration is comparatively so insignificant that the birds evidently return to their northern home by other routes. In regard to this, I have already said that, in my opinion, according to the data at hand, it is still premature to try to definitely ascertain their routes, seeing the need for more numerous and exact observations. I am accordingly far from sure that all the white-fronted geese wintering in Great Britain, Holland, and North France arrive thither from Northern Russia and Finmark (although small numbers come from the latter country), but admit that part arrives from Greenland and Iceland. As to the natives of those countries, we cannot at present indicate their winter haunts; and as to the passage of these geese along the Volga, Kama, etc., observations more accurate than those which exist are still needed. This is the more necessary, seeing that the lines of migration of geese are far from remaining unchanged from year to year. As is truly observed by Professor Menzbier, "it must further be stated that white-fronted geese do not travel year after year along the same branches of the main lines of migration. Something causes them to leave their old favourite road for a new one, and then, together with the alteration in direction of the migration route, the halting-places are also changed. It is indeed possible that it is precisely the alteration in the conditions of the halting-places and the facilities for getting food that compel the white-fronted geese to vary their minor lines of migration."

To confirm this by facts, it will suffice to quote a statement by Eversmann in his *Yestestvennaga Istoria Orenburgskago Kraya* (part iii. p. 557, 1866): "The white-fronted goose," he writes, "does not breed in our region (Orenburg Government): in spring, in the month of April, it flies past in great flocks towards the East and North-East, while in autunm, September and October, it flies back. The zone of passage of the white-fronted goose is very wide, so that one boundary passes through the outskirts of Kazan and the other through those of Orenburg and Iletsk. But the same flocks yearly pass over the same places, keep always one course, and rest on familiar waters, so that at a short distance farther north or south not a single goose is met with. It happens, however, sometimes that, from some unknown cause, the birds abandon the known track and select a new one far northwards or southwards, and then pass annually over the newly chosen route. Thus, for example, thirty

or more years ago, white-fronted geese year by year visited the village of Spasskoe (Orenburg Government and district) where they rested; later on, they suddenly abandoned this route and chose another, many miles to the north, and since then not a single white-fronted goose has been seen in the neighbourhood of Spasskoe." White-fronted geese during their migration fly, like other geese, in a chain, key, or cone, while sometimes (as I have myself observed, although but very seldom) from one side of the angle extends a chain again forming an angle, and in such case these geese usually fly high. Quite otherwise do they fly on short distances, on which occasions, when flying forth to feed in the steppes and back again to water, they do so in a disorderly crowd, and more frequently in a bunch. Flocks of white-fronted geese of several thousands, as observed by Mr. A. A. Brauner in the lower reaches of the Dniester, I have never seen in the Azov region, although I often observed 200 to 300 birds in a pack; but they still more frequently fly in autumn in gaggles of 70 to 150, and smaller parties of 40 to 50.

In the Don steppes I have flushed swarms of these geese amounting to tens of thousands; but, having once risen, these hosts immediately broke up into comparatively small flocks and flew off, one after the other, either to another part of the steppe or to water, uttering all the time their loud, laughing cackle.

Usually the first flight to the steppe to feed took place at dawn,[1] before sunrise (this was from September to the middle of November, but sometimes later); at 8 in the morning they would return to the Mius estuary, whence at 11-12 they again flew to the steppe for an hour or two, and about 2 to 3 in the afternoon returned to drink, and by 4 o'clock were again on the pasture, where they remained till almost complete darkness. This was the mode of life of the birds if unmolested; but the flocks when alarmed often changed such disposition of their time, and the regularity of their visits to the fields was broken. Some authors consider the white-fronted goose less wary than other geese, while others deny this. Personally, I, after pursuing them with great perseverance, have become convinced that their caution nowise falls short of that of other geese, the only difference being that it is usually possible to approach them on foot or otherwise nearer than, for example, the grey-lag, although they hardly ever allow one to come within gunshot.

Mr. Trevor-Battye relates that the gosling which he managed to catch on Kolguev dived splendidly, but was at last seized by a dog, which had gone under water in pursuit.

This gosling[2] "had a way of standing straight up on end, but with his breast puffed out," and was "not in the least bit shy of us. He inspected every corner of the tent," and during expeditions of his masters followed them, devouring the shoots of various plants, among which he was especially fond of mare's-tail (*Equisetum*).

The same author gives a very minute and interesting description of the taking of moulting geese by the Samoyeds, who drive them into nets set at the water's edge and ending in a cul-de-sac. This goose-hunting is of great importance to the natives, who thus provide themselves with food for the whole year; but the chief part of their take is composed not of the species described here, but of *Branta bernicla*. At the end of his interesting book, the author makes the following statement about the white-fronted goose, which he correctly calls "kazarka" in Russian, but in Samoyed "seer grün": "Among the many white-fronted geese brought in by the natives, I never saw a single individual which I could refer to the smaller

[1] This refers to the Mius estuary, twelve versts from Taganrog and about forty from where the Mius falls into the sea. The Mius with its shoals, on which the geese rested and often passed the night, is about two versts broad.

[2] Unfortunately, the author does not give a description of this gosling, and I do not know of any.

race, *A. erythropus*, L.[1] There was certainly some variation in size, but I have no doubt that, like the specimens which I brought back, they all belonged to the larger form. The white-fronted on Kolguev was far more wary than the bean-goose. A sitting bird would not allow you to get within gunshot before she left her eggs. I may at once say that I never myself identified this bird at the nest, though I have no doubt whatever in my own mind that one of the nests we came across during our walk across the island belonged to this species.[2] The four eggs, slightly smaller and rounder than those of the bean, and also of a clearer creamy white, exactly agreed with some brought to me with the old birds by Mekolka the Samoyed. I have reason to believe that, while the bean-goose is pretty generally distributed over the whole island, the white-fronted affects rather the north-eastern district.

"On Kolguev this species moulted rather later than the bean. Of those we took at the goosing on July 18, none had lost their primaries, and I saw many on the wing. I have described elsewhere in this book the habits of the young bird in the down, which we kept for a few days alive. They did not bring their young down to the sea as early as the bean, but kept them to the lakes."

As regards Novaia Zemlia, Mr. Pearson gives us very little information. He found the white-fronted goose both in Lüdtkeland and on the southern island. The length of the specimens varied between 25 and 28 inches. They were in full moult about July 23.

Middendorff (whom, by the way, all authors quote when writing of this goose) observes that: "The vanguard of this species appeared on Boganida (70° N. lat.) some days earlier than *A. segetum*,[3] viz. on April 27. On June 3 these geese reached the river Taimyr.

"To this species belonged the majority of the geese breeding in the Taimyr district; and, according to the statement of my interpreter, at the mouths of the Pyasina and Bolochnaya (Balochnaya?) this goose and the following are the almost sole nesters.[4] On July 10, I found, in 74° N. lat., a nest with two eggs in a hollow made in the top of a high conical grassy tussock. The eggs were disposed on a thick layer of down. At the same time the birds that were not breeding began to moult, and by July 15 we met with several flocks which were no longer able to fly.

"Other birds were still dropping their feathers on July 27. On August 3 they were already fledged, although on August 2 I found, on the rocky Taimyr Lake, a goose of this species engaged in hatching her eggs."

Farther on, Middendorff says that one specimen of the species *Anser intermedius* at any rate with the bill-colouring of the latter, had a culmen length of 46 mm. (= 1.81 in.), and from gape 49 mm. (= 1.92 in.), with tarsus 68 mm. (= 2.67 in.).[5]

Passing now to the North American continent, we learn that Dall found it[6] breeding in great numbers on the banks of the Yukon in Alaska. He describes the nest as a mere hollow in the sand. Farther eastwards MacFarlane found, at the mouth of the Anderson, a nest of this goose thickly lined with dry grass, feathers, and down. The number of eggs in

[1] i.e. *A. finmarchicus*, Gunner.
[2] This could be determined only by killing the bird straight from the nest.
[3] Either *M. arvensis* or *M segetum serrirostris*.
[4] i.e. *A. finmarchicus*.
[5] Evidently, this was a younger specimen with dark spots on the bill, which in fully mature birds is orange.
[6] *A. albifrons gambeli*.

a clutch is usually stated as from 5 to 7, but there is no doubt that the number is sometimes greater.

The table of dimensions and weights of eggs of the white-fronted goose given below was compiled by Mr. Göbel on the basis of 24 specimens.

Max. breadth 56.5 mm. (= 2.22 in.), with length 88 mm. (= 3.48 in.) and weight 1248 cgrm. (Siberia).
Min. breadth 49.5 mm. (= 1.94 in.), with length 87.5 mm. (= 3.44 in.) and weight 1122 cgrm. (Boganida).
Max. length 88.5 mm. (= 3.48 in.), with breadth 56.5 mm. (= 2.22 in.) and weight 1248 cgrm. (Siberia).
Min. length 76 mm. (= 2.99 in.), with breadth 53.5 mm. (= 2.10 in.) and weight 1062 cgrm. (Novaia Zemlia—Chernaya Guba).
Max. weight 1248 cgrm., with breadth 56.5 mm. (= 2.22 in.) and length 88.5 mm. (= 3.48 in.).
Min. weight 996 cgrm., with breadth 54 mm. (= 2.12 in.) and length 78.5 mm. (= 3.09 in.).

or

24 eggs gave: mean breadth 53.9 mm. (= 2.12 in.), max. breadth 56.5 mm. (= 2.22 in.), and min. breadth 49.5 mm. (= 1.94 in.).
24 eggs gave: mean length 81 mm. (= 3.19 in.), max. length 88.5 mm. (= 3.48 in.), and min. length 76 mm. (= 2.99 in.).
20 eggs gave: mean weight 1098 cgrm., max. weight 1248 cgrm., min. weight 996 cgrm.

Of the breeding of this species in captivity there is no lack of information, and probably it might locally, especially in the north, become a perfectly domestic bird, if any one would undertake the task of breeding.

These geese lay pretty frequently in confinement, and become so accustomed to the locality, if the latter is perfectly suitable for them, as not to evince any desire to leave during the autumn and spring migrations, even with the wings unclipt.[1]

Cases are known of crosses between the white-front and the bean (which?), as also between the former and the grey-lag, in confinement.

The reader will find an account of one case of such supposed hybrid at the end of the present section.

In the *Zoologist* for 1902 (pp. 337-351), Mr. Coburn states that among white-fronted geese killed in Great Britain besides *Anser albifrons*, *Anser gambeli* is undoubtedly met with; and, describing in detail the various plumages of both forms from English specimens, and emphasising the importance of the larger bill of *Anser gambeli*, this author maintains the specific distinctness of the latter.

Although minutely discussing the plumage, and scrupulously indicating the dimensions of the specimens, it seems to me that Mr. Coburn measured the length of the bill not along the straight line from the feathering of the forehead to the end of the nail on the upper mandible, but along the curve, which always gives somewhat greater dimensions.

A careful study of the article in question has, however, failed to convince me that the geese taken by the author for *gambeli* really belonged to that American variety of the white-fronted goose. I am not in a position to categorically state that Mr. Coburn is mistaken in his identification, as I have not seen his specimens, but the following considerations compel me, on the basis of the author's own data, to doubt the truth of his deductions.

First of all, Mr. Coburn says that these geese have much more black on the belly than *A. albifrons*; but I think that Russian and Siberian examples of *albifrons* may be seen with just as black an abdomen. It must be remembered also that in this respect the whole of this group of geese is subject to very considerable variation. We saw this in connection

[1] The *Field* for 1902 (Nos. 2584, 2585) contained two notes on the breeding of these geese on private waters in Great Britain; one being by Mr. Frohawk.

with *Anser anser*, and shall again do so in the lesser white-front, *Anser finmarchicus*. In the grey-lag, the belly, so far as I know, is never wholly black, but in the lesser white-fronted goose this is a very common occurrence. In the same degree as in the latter, this colouring varies also in the white-fronted species, while, so far as the evidence of the material I have examined goes, the greater or smaller amount of black on the belly is not dependent on the size of the bill, nor on that of the bird. Accordingly, I cannot regard this character as sufficient evidence for assigning the British large-billed *A. albifrons* to the American race, *A. albifrons gambeli*.

As regards length of bill, the dimensions given by Mr. Coburn, although very large, yet, with the exception of one case, viz. a bill 2 inches (=51 mm.) long, do not exceed the size of the bills of Russian birds. In regard, however, to the colouring of the bill, the bright orange-red colour given by Mr. Coburn does not at all agree with the descriptions known to me of the bill of *Anser albifrons gambeli*, in which, as American authors describe it, the bill is milk-white, while the terminal part and the edges of the upper mandible are tinged with pale pink, and the basal portion shows a slight bluish shade; the long patch on the culmen, the edges of the nares, a small spot under the nares, and the basal two-thirds of lower part of lower mandible being orange-yellow. That is, the Americans describe the bill of *Anser albifrons gambeli* exactly as it is in the Russian and Siberian *A. albifrons*. Of the latter I have given a sufficiently detailed statement of all I know in its proper place. In regard to the bright orange-red colouring which, in Mr. Coburn's opinion, appears in birds as the breeding period approaches, I think that when such birds are met with, it may be at once assumed that they are particularly well-fed specimens, since I have no doubt that this orange colour is the result of the deposit of subcutaneous fat. I cannot but add the following remarks in conclusion. Mr. Coburn refers to an article in the *Ibis* for 1902 (p. 269) by Mr. Gurney, to whom he sent for examination a specimen of lesser white-fronted goose shot in Norfolk in January 1902.

Now Mr. Gurney discussed the subject in question in the above-mentioned article, where he gives drawings of the bill and part of the head of this supposed lesser white-fronted species, and below a drawing of the bill and head of a specimen shot in Egypt.

The most superficial inspection of Mr. Gurney's plate is quite enough to convince an expert that the upper figure has nothing in common with the lower one, and the dimensions of the bill, 1.50 inches (=38.10 mm.), exceed those of the largest Russian and Asiatic birds of this species yet known to me. Besides this, the curvature of the edges of the bill in the upper figure clearly testifies (if the drawing be correct) that we here have to do with no true lesser white-fronted goose. I am very sorry that time did not allow me to ask the above-named gentlemen to let me see their specimens, but I hope my present note will help to clear up this interesting question and will show that all English white-fronted geese belong to the ordinary species.

Cross between White-fronted Goose and one of the Species of the Genus *Melanonyx*

Before me lies the skin of a remarkable goose, obtained by Dr. Sushkin, which I cannot regard as anything else than a hybrid between the white-fronted species with one of the bean-geese, and most probably with the true bean-goose (*Melanonyx segetum*).

As certified by Mr. F. K. Lorenz, this was a young female; as is indeed evident from the feathers of the back and scapulæ being narrower than in adults.

The structure of the bill brings this specimen nearest to the white-fronted goose.

Wing	590 mm. (= 23.20 in.)
Culmen	45 mm. (= 01.77 in.)
Greatest depth of lower mandible visible from without with shut bill.	$5\frac{1}{2}$ mm. (= 00.21 in.)
Nail of *upper mandible* contained $3\frac{1}{4}$ times in culmen; it is dark, with a horn-white and very sharp point.	

Base of bill dark, probably black during life.

Number of teeth along sides of upper mandible not more than 22 or 23 (I did not open the bill, in order to prevent spoiling this interesting specimen). Nail of lower mandible, apparently, not black but light horn-colour. The light band and light colour passing from this under the nares and along the edges of the upper mandible were, I was informed, ochre-yellow; but whether this was seen in the bird when just killed or some time after, I do not know.

Accordingly, the bill, of the type characteristic of the white-fronted goose, with the exception of the less number of teeth and the comparatively larger nail on the upper mandible, in colouring and pattern recalls the bean-goose. Head and neck entirely light brownish, with mousy shade; near the upper mandible no traces of either white or black feathering (latter peculiar to young *A. albifrons*). Feathers of back and scapulæ dark brown with lighter greyish brown tips. Breast light brownish grey, gradually becoming greyish white on belly, which in its turn passes into the pure white of vent and lower tail-coverts. Flanks light greyish brown with inconspicuous light tips, so that there is none of the barred effect usually seen in adult geese of these races. Secondaries by their dark colouring sharply contrasting with their greyish brown coverts, exactly as in typical *A. albifrons*. Rest of plumage agreeing with that of young white-fronted geese.

This female specimen must be considered as in her first year. It was obtained at the end of October 1902, in Gryazovets, Vologda Government.

I can only regret that this specimen was not an adult bird, in which case its characteristic points would doubtless have been more marked.

THE LESSER WHITE-FRONTED GOOSE

ANSER FINMARCHICUS, GUNNER

Plates 5 and 6

English—*The Small White-fronted Goose*; *Lesser White-fronted Goose.*
Russian—*Malaya kazárka; kozárka* (*teste* Sabaneev, in Transural); *malaya belolobaya kazarka* and *kozarka; kazará* and *kozará* (collective); *maly beloloby gus, garkavy gus* (Little Russian, *teste* Pallas = snuffler); *piskun* (Kamchatka); *piskulka* (Perm, *teste* Sabaneev; and elsewhere); *tatáry* (Cossacks in Kirgiz Steppe, acc. Maleev[1]); *Chugaika* (Siberia) *Vizgun* (Dall gives this name, without stating to which species it belongs; seemingly to this, but in what district).
Bashkir—? *Kara-káz* (= black goose; which seems to be doubtful).
Ostyak—*Kirri-sém* (on Surgut and Irtysh, *teste* Pallas = sturgeon-eye).
Vogal—*Lyak* (Pallas).
Samoyed—*Singere* (Pallas).
Mongol—*Achin* (Pallas).
Kalmyk—*Shoshinar-galim* (Pallas).
Tungus—*Ilyaglí* (Pallas).
Yakut—*Khan-khalás; Lynglynyá*, also *Lyglyyà.*
Lamut—*Karkalú* (Pallas).
Kamchadal—*Keiresh; Kéresid* (Pallas).
Finnish—*Kílgo-hanhi; Kílju-hanhi.*[2]
Lapp—*Riodi-chuonya* (Muonjoniska); chuónya (Karesuando); *Ukka-chuonyagaz* and *kelpinyun chuonya* (Utsioki); *galben-yudne chuónya* (Finmarken). These names I borrow from F. D. Pleske.
German—*Kleine Blässengans; kleine Blässgans; Zwerg Blässgans; kleinschnäbelige Gans; Schwalbengans; Zwerggans.*
Swedish—*Finmarke Gaas* (Gunner, 1767).
French—*Oie naine.*

Anas erythropus, Linn., Syst. Nat., i. p. 197 (*partim, cum A. albifrons confusa*), 1776.
Anser finmarchicus, Gunner, in Knud Leems, Bestrivelse over Finmarkens Lapper, J. E. Gunneri Anmaerkinger,

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[1] *Psovaya i Ruzheinaya Okhota*, 1900, book ix., July.

[2] Notwithstanding Pallas's statement that he knows only one species of white-fronted goose (*A. erythropus*), it must be presumed that he met with both species, and that, like Linne, he confused them; therefore very probably the above-quoted native names refer partly to the white-fronted goose, *A. albifrons*, partly to the lesser species. Unfortunately, it is now impossible to decide this question—the natives must be questioned afresh. The dimensions of the wing given by Pallas do not enable me to decide what goose he means, as a wing of 15 in. (= 380 mm.) may occur among large lesser white-fronted geese as well as among the smallest specimens of the larger species.

p. 264 (1767) = Canuti Leemii, De Lappon. Finmarchiae, *cum* J. E. Gunneri *notis*, No. 115, p. 264; Reichenow, J. f. Ornit, 1890, p. 81.

Anser albifrons (*partim*), Gmelin, Syst. Nat., i. p. 509 (1788); Bonnaterre, Encyclop. Méthod., i. p. 114 (1790); Radde, Bull. Soc. Mosc., 1854, iii. p. 160 (*partim*); Eversm., Yest. I. Or. Kr., iii. p. 556 (*partim*) (1868).

Anser temminckii, Boie, Isis, 1822, p. 882; Middendorff, Reis. Sib., ii. p. 228, pl. xx. (pull.) 1851; Radde, Reis. S.-O. Sib., ii. p. 358 (1863).

Anser brevirostris, Brehm, Isis, 1830, p. 996 (1830); *id.*, Nat. Vög. Deutschl., p. 844 (1831); Fritsch, Vög. Eur., p. 406, pl. 45, fig. 3 (juv.), fig. 7 (adult), 1870.

Anser cineraceus, Brehm, Lehrb. Nat. Eur. Vög., ii. p. 722 (1824).

Anser minutus, Naum., Vög. Deutschl., xi. p. 364, pl. 290 (1842); Nordmann., J. f. Orn., 1864, p. 376 (Fennia); Finsch, Ibis, 1877, p. 62; Seebohm, Birds Jap. Emp., p. 238 (1890); Bree, Birds Eur., iv. p. 137 (1867); Kessler, Russk. Ornit., p. 369 (1846); Radde, Ornis Cauc., p. 443 (*partim*), 1884; Buturlin, "Psov. i Ruzh. Okh.," 1901 (Dikie Gusi R. T.); *id.*, separ., *passim* (1901); Przewalski, Put. Uss. Kr., 1870, *passim*; Bogdanov, Pt. i Zv.-Povolzhya, p. 148 (1871); Palmén, Cab. J. f. Orn., xxiv. p. 53 (1876); Deryugin, Trud. J. S. Pb. Obshch. Yest., xxix. p. 2 (1898); Sushkin, MS. letters to author; Zhitnikov, "Psov. i Ruzh. Okhota," 1902, p. 134.

Marilochen brevirostris, "Heckel," Reichenbach, Av. Syst. Nat., p. ix. (1852).

Anser erythropus, Pallas (*partim*, *cum albifr. mixta*) Zoogr. Ross.-As., ii. p. 225 (1811); Newton, Proc. Zool. Soc. Lond. (1866), p. 341; *id.*, "Ibis," 1860, p. 406; Degl. and Gerbe, Orn. Eur., ii. p. 486 (1867); Hume and Marshall, Game Birds of India, iii. p. 78 (with pl., 1880); Dresser, Birds of Eur., vi. p. 383 (1879); Salvadori, Cat. Birds Brit. Mus., xxvii. p. 97 (1895); Menzbier, Ptitsy Rossii, i. p. 740 (1895); *id.*, Okhotn. i Prom. Pt. Ross. i Kavk., ii. p. 468, pl. 133 (*sub A. albifrons*), 1902; Trevor-Battye, Icebound on Kolguev, p. 423 (1895); Zhitnikov, Nabliud. na reke Atreke, "Psov. i Ruzh. Okhota," 1900; *id.*, sep. imp., *passim* (1900); Silantiev, Opred. Yevr. Pt., 1901, p. 112; Kholodkov. i Silantiev, Pt. Yevr., p. 523; Alpheraky, "Zhurn Okhoty," 1877, p. 80; Khomyakov, Pt. Ryaz. Gub., 1900, p. 34 (*A. albifrontis* var.); Finn, How to know Indian Ducks, p. 19, 1901; Blanford, Fauna Brit. Ind., iv. p. 418 (1898); Oates, Man. Game Birds India, 1899, p. 53; Taczanowski, Faune Orn. Sib. Or., p. 1093 (1893); Chapman, Wild Norway, p. 298 (1897); Karamzin, A., Pt. Samarsk. i Ufim. gub., p. 183 (1901); Ruzski, M., Sist. Sp. Pt. Kaz. gub. (Trudy Yest. Pr. Kaz. Univ., tom. xxv. pt. 6, p. 115) (1893); Macpherson, History of Fowling, 1897, p. 222.

Anser albifrons minutus, Seebohm, Hist. Brit. Birds, iii. p. 505, pl. 62 (*ovum*), 1885.

Anser albifrons, var. *erythropus*, Buturlin, Tabl. Opred. Plastinchatokl. ("Psov. i Ruzh. Okh.," 1900, p. 9).

Anser erythropus minutus, Palmén, Bidr. Sibirsk, Ishafsk. Fogelf. Vega-Exp., vii.

Anser rhodrhynchus, Buturlin, "Psov. i Ruzh. Okh.," 1901 (Dikie Gusi Ros. I., Febr.-Apr.); *id.*, sep. impr., p. 19; *id.*, Sinopt. tabl. Okhotn. Pt. Ross. I., 1901, p. 46; Zhitnikov, "Psovaya i Ruzh. Okh.," March 1902, p. 134 *seq.*; Buturlin, "Psov. i Ruzh. Okh.," 1902, June, p. 120 ("Yeshche o belolobykh gusyakh").

Adult Male

Colouring of head and upper half of neck brown, for the most part with a coffee or cinnamon (ruddy) shade of greater or less intensity, or chestnut-brown, considerably darker than in white-fronted goose. On forehead a large white blaze, extending from very base of bill backwards, more or less in a wedge-shape, between eyes considerably beyond line joining their anterior angles. From this blaze white descends, narrowing considerably, along sides of base of upper mandible to gape; here it is interrupted and is again renewed opposite base of lower mandible, and sometimes is here in contact with white terminal part of feathering of chin, while sometimes this spot is isolated, this being independent of sex or age, and simply an individual peculiarity. White of forehead and feathering along sides of base of bill bordered posteriorly by a very dark, blackish band, passing gradually into brown colouring of rest of head and neck. Lower half of neck, breast, and flanks lighter rufous brown with light greyish edgings to feathers; belly still lighter, mingled with pure white and with large black, transverse, irregularly shaped patches, which apparently with age become more and more extensive, and in very old individuals often so far coalesce that the whole of the belly is almost entirely black.

Variability in size and number of black patches so great that it is difficult to find two specimens alike in this respect.

Vent and under tail-coverts pure white. Back and shoulders brown, varying in depth in different individuals, with white edgings to feathers, and sometimes extremely similar to feathering of same parts in *Branta bernicla* ; rump blackish, upper tail-coverts pure white. Tail consists of sixteen greyish black feathers with narrow white edgings and broad white tips.

Upper lesser wing-coverts ashy blue, median similarly coloured basally, but with brownish tint on outer half of feathers ; greater secondary coverts brown with narrow white tips ; primary coverts light cinereous grey.

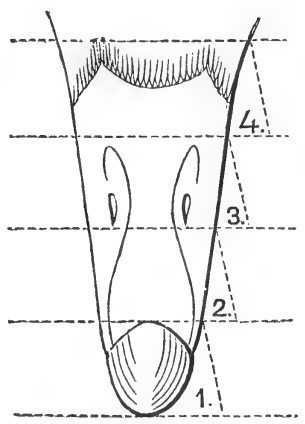
Outer primaries grey with blackish tips ; inner primaries and outer secondaries entirely brown-black, so that with folded wing a fairly conspicuous brown-black speculum is obtained.

Inner secondaries and tertiaries same colour as scapulars. Shafts of all feathers white, with exception of the black tips.

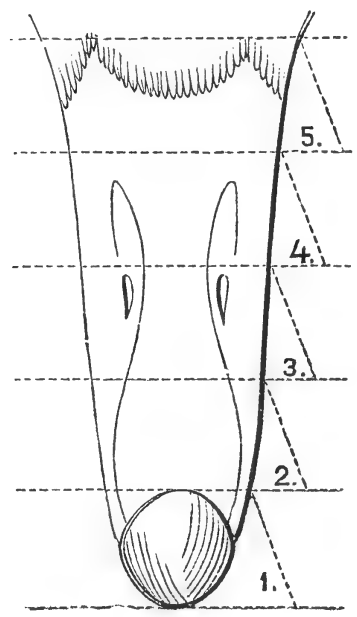
Under part of wing very dark grey, and axillaries still darker—blackish.

Bill very different from that of white-fronted goose, much shorter, and more conical in shape, *i.e.* compared with tip, much thicker at its base; tomia of upper mandible not curved at all, and in living and freshly killed specimens completely covering teeth of upper mandible, of which there are altogether 22 on each side instead of 28, as usual in the white-fronted goose.[1]

It must, however, be borne in mind that, although in the majority even of dry skins in the lesser white-fronted goose the teeth of the upper mandible are not visible when the bill is shut, sometimes when, in drying, the skin of the edges of the upper mandible gets warped or slightly raised, its teeth are disclosed. In the relation between the length of the nail of the upper mandible to the total length of its culmen, there is also a considerable difference, as shown in the annexed drawings.



Anser finmarchicus, ♂
Culmen 35 mm.



Anser albifrons, ♂
Culmen 53 mm.

As regards the colouring of the bill, I am compelled to go into somewhat greater detail below ; while its dimensions are given in the general table of measurements of this species.

The feet of this small species of goose are apparently, in the vast majority of cases, orange-yellow, with paler (yellow) webs ; the ceroma is lemon-yellow or also orange-yellow. Iris dark chestnut. As Dr. Sushkin informs me, the eyelids (orange-yellow or lemon-yellow) are very perceptibly swollen, so that a marked ring is produced around the eye, such as is never the case in *A. albifrons*. In consequence of this, the Ostyaks call this goose *kirri-sém* (sturgeon-eye), as stated by Pallas.

Adult Female

Resembles male, and, as in all geese, is somewhat less in size ; although some females are large, not yielding in this respect to the smaller ganders, their bills are shorter than in males of same size.

[1] It is very possible that, with fuller material, some specimens will be found to have one or two teeth more or less, but it may be presumed that the number in the lesser white-fronted goose never reaches that in *A. albifrons*.

The dimensions given here refer to adult birds of both sexes, since, notwithstanding the very considerable material at my disposal, this was far from adequate to determine the limiting dimensions for each sex separately.

Total length	505–622 mm. (= 20–24.4 in.)
Spread	1280–1300 mm. (= 50–51 in.)
Wing	345–395 mm. (= 12.50–15.50 in.)
Culmen	29–37.5 mm. (= 1.10–1.47 in.)
Tarsus	51–66 mm. (= 2–2.57 in.)
Middle toe without claw	49–56 mm. (= 1.11–2.25 in.)

Number of teeth on a side of upper mandible, 22, or perhaps 23. Weight from 4 to 6 Russian pounds.

The folded wings very considerably overlap the tips of the tail-feathers, while in the white-fronted goose the wings rarely do so, and then not more than 20–25 mm. (=0.78–0.98 in.).

Note.—From among the separate individuals quote the measurements of a large male from the Turgai Territory and a large female from the Ryazan Government, communicated by Dr. Sushkin.

Adult ♂	Length	622 mm. (= 24.4 in.)
	Spread	1295 „ (= 50.74 in.)
	Wing	38 „ (= 15 in.)
	Tarsus	66 „ (= 2.59 in.)
	Culmen	37 „ (= 1.35 in.)[1]
Adult ♀	Length	609 „ (= 23.9 in.)
	Wing	383 „ (= 15.10 in.)
	Tarsus	60 „ (= 2.36 in.)
	Culmen	30 „ (= 1.18 in.)

Young Birds in First Plumage

Differ from adults by total absence of white on forehead and along sides of base of upper mandible, as also on chin. White around bill replaced by black—usually rather narrow, band, 2–4 mm. Only after first moult stray white feathers appear on this black band.

Lower part of body light smoky brown, the feathers being edged with dingy yellow. Of black transverse patches on lower surface not a trace. Under tail-coverts, vent, and crissum (posterior part of belly) white. Bill pinkish grey dingy in colouring. Legs pale dingy yellow, sometimes with more or less strong touch of orange.

I may remark that Dr. Sushkin informed me that he had seen in young birds, in their first autumn, white feathers growing on the forehead, but that it was not known how far this feature is normal, and that he had not noticed it in *A. albifrons*. But as there is no doubt the lesser white-fronted goose in its first autumn begins to change its first plumage, the appearance of white feathers on the forehead receives a very simple explanation. Dr. Sushkin goes on to say: "Already in the first plumage, in the autumn, the edge of the eyelids in *A. minutus* is noticeably swollen (in male more markedly) and of a lemon-colour. Later orange-yellow and still more swollen."

[1] I may observe that neither the bill-measurements of Taczanowski in his *Faune ornithologique de la Sibérie orientale*, nor those of G. T. Radde in his *Ornis Caucasica*, could be here taken account of, as they seem to me excessive for the lesser white-fronted goose, and I have no doubt that both authors in this case took small specimens of *A. albifrons* for the lesser white-front, although it is possible that Taczanowski, in giving culmen 40 mm., simply made a hurried and approximate measurement.

Young Birds after Second Moult

Already white on head, but with black speckles (black feathers) and white spot at mental angle very small. Scanty small black patches already appear on belly, increasing in size and number with each successive year.[1]

Young in Down

Judging from illustration given by Middendorf, under the name of *A. temminckii* (*Sib. Reis.*, ii. pl. xx. fig. 2), above dark grey-brown, under surface and forehead to posterior angle of eyes greenish yellow with dark longitudinal streak across eyes. In freshly killed specimen the bill was dark greyish brown with reddish yellow point. Legs yellow-grey shot with greenish.

Seeing that by many authors the bill of this species is described as orange, Mr. Buturlin decided to separate the geese of more easterly origin without orange bill as a separate species, which he described under the name of *Anser rhodorhynchus*.

If, merely on statements in literature, the esteemed author of *Dikie Gusi Rossiiskoi Imperii* had grounds or the right to proceed thus, I, on the other hand, after examining his question critically, come to the same result as in the cases of the grey-lag and white-fronted goose, namely, that the majority of authors' descriptions of the bill of this goose as orange are inaccurate, and I am therefore compelled to add the species established by Buturlin to the number of synonyms for *A. finmarchicus*. I had already written this, when there appeared in *Psov. i Ruzh. Okhota* for 1902 (March number, p. 134 *et seq.*) Mr. Zhitnikov's criticism of the species *A. rhodorhynchus* described by Buturlin, which completely coincides with my view.

I am here compelled to make a rather long and tiresome digression, which will, however, supply some information supplementing the above-cited descriptions of this species.

Although it is the custom to consider that there is no difference in plumage between the lesser and ordinary white-fronted goose, this is perfectly untrue. The arrangement of the colouring is indeed the same, but the head and upper half of the neck in the lesser white-fronted goose are considerably darker than in all white-fronted geese whose skins I have examined while writing the present book. Further, the back is also darker and strikingly recalls in its colouring that of the brent-goose (*Branta bernicla*). But the chief distinction in plumage between the two species consists in the breadth of the white patch on the forehead, which in the white-fronted goose only in rare cases reaches backwards to the line joining the anterior angles of the eyes (it is mostly far from reaching this line), but which always considerably passes this line in the lesser white-fronted goose. The breadth of this patch in the adult lesser white-fronted goose is always more than an inch (not less than 33 mm. = 1.25 in.), while in the white-fronted goose it is usually considerably less than an inch, and only in rare cases is a full inch in breadth, 25.4 mm.

[1] It is very probable of the lesser white-fronted goose Maleev writes, in his article (*Psov. i Ruzh. Okh.*, 1900, pt. ix. July, p. 52), that in the Kirgiz Steppe "the Cossacks determine the years of the kazarka by the dark bars across the bird's belly. In young birds, the lower part is whitish, there later appearing one, two, and more bars; as many as seven having been met with, while in some the whole of the under-side is black." The Cossacks call them "tatars."

(= 1 in.); but more often the breadth of the blaze in this species only attains 19–20 mm. (= 0.74–0.78 in.). Consequently, the absolute breadth of this white patch in the adult lesser white-fronted goose affords always considerably greater, and is a conspicuous and striking character for the purpose of distinguishing these two species. With Mr. Oates's opinion, that the black band bordering the white patch behind is of constant breadth, I cannot agree, as it is in fact variable in breadth and even in colouring, being sometimes almost black, and at other times hardly darker than the ground-colour of the head. Moreover, owing to the general darker colouring of the head in the lesser goose, this black band is less striking than on the lighter ground of the head of the white-fronted goose.

In the lesser white-footed goose the yellow colouring and slightly swollen state of the ceroma are extremely characteristic. These swollen eyelids, appearing so early (in the first plumage), are of a lemon-yellow colour, forming a complete ring around the eye, which, as we have already seen, is never the case with the white-fronted goose.

Lemon-yellow is the colour given to this ring by Mr. Finn in the case of three living birds [1] observed by him in captivity in India. Dr. Sushkin, we have seen, says the same, adding that in more mature birds this ring becomes orange-yellow. But most important of all is the question of the colouring of the bill of this small goose, which has led to such grave misunderstandings among various authors. Some of them, and among the number Count Salvadori, call the colouring of the bill of this species orange-yellow, this determination being based on dry skins and stuffed birds. Moreover, the fact is apparent that in the majority of cases these authors copied the description from each other. The error is perfectly intelligible, if we take into consideration the fact that in the whole of Western Europe this goose is comparatively rare, and that only very few who have written about it had living or freshly killed specimens in their hands. There are also authors who call the bill reddish grey (young birds) or dark flesh-colour (old birds), and that in birds undoubtedly obtained in Western Europe.

Apparently, those authors, who had not the opportunity of seeing freshly killed lesser white-fronted geese, borrowed the description of the colouring of the bill mainly from Naumann.[2] But the latter says: "The colour of the bill of young birds till the first autumn moult is reddish grey, the nail blackish, the latter becoming later greyish white, and the bill pale orange-yellow; in old birds, it is bright reddish yellow or orange, the nail yellow reddish white. Within, the bill is very pale reddish yellow, the tongue dark flesh-colour. As after death, so also the dry bill turns a light horn-yellow colour, from which may approximately be guessed the colour it had in life."

The colouring of the bill given by Naumann for young birds (*i.e.* in first plumage) is true alike for the specimens from Europe (European Russia) and for the oriental representatives of this species. In regard, however, to old birds, great doubt exists in my mind as to his expression bright reddish yellow or orange. To admit inaccuracy in Naumann's description is difficult, but his further expression: after death the bill turns a light horn-yellow colour, from which may approximately be guessed the colour it had in life—makes one involuntarily think that, perhaps, Naumann trusted to such a possibility and called the bill orange by judging dry skins.

We have already seen that the same statement made by Naumann, after thoroughly overhauling the question, in regard to the colouring of the bill of the white-fronted goose,

[1] Finn, *How to Know the Indian Ducks.*
[2] *Vögel Deutschl.*, xi. p. 868.

proved to be inaccurate, and for the same reason, namely, that Naumann undoubtedly tried to guess the colour of the bill of *A. albifrons* from dry skins, while the live birds seen by him in Potsdam had bills of a beautiful rosy colour. The reader will have seen that I had to dispute the existence of normally orange bills in the case of the grey-lag (*Anser anser*), and, as it seems to me, not unsuccessfully. The same has happened here, and I am obliged to absolutely deny the existence of orange colouring of the bill in the living European lesser white-fronted goose.

Unfortunately I have to regret that when I lived in Taganrog, where the lesser white-fronted goose passes in autumn in vast numbers, I did not note exactly the colouring of the bills of the individuals which came into my hands, some of which I shot myself, and some of which were bought; but I am convinced that if they really had orange bills, such a circumstance would hardly have escaped my attention.

So far as I remember, the colouring of the bill of freshly killed white-fronted geese of the greater and lesser species, which more than once I examined together, in general showed no marked differences, which would have been striking were the bill of the smaller species orange. The few specimens of lesser white-fronted geese which I have had the opportunity of seeing the day after being killed, either from Finland or the Novgorod Government, had bills *absolutely* dark flesh-coloured. I particularly well remember two examples, one from Finland (Vyborg Government), an old gander, with confluent black patches on belly, which had a bright rosy flesh-coloured bill, and the other, a male from the neighbourhood of Novgorod, with a rosy white bill, whose skin served as the original for Mr. Frohawk's drawing in Plate 5 of this work.

According to Dr. Sushkin, "the bill in the lesser white-fronted goose, as in the kazarka, is of a beautiful and pure rose-red colour (peach-blossom). The depth of this colour varies, and is, it seems, connected with the afflux or reflux of blood (do not confuse this phenomenon with extravasation, which occurs only in consequence of a wound in the bill or its neighbourhood). Sometimes the bill is very pale. In *A. minutus* I have not seen an orange tinge on the bill."[1] This statement is thus to the effect that in European birds of this species the bill is (if only occasionally, as is the case with the grey-lag) yellow or orange; but I have been unable to find, and therefore personally do not believe in, the existence of such lesser white-fronted geese.

These, then, are the reasons why I cannot recognise two separate geographical races among lesser white-fronted geese, and therefore add *A. rhodorhynchus*, Buturlin, as a synonym of *A. finmarchicus*, Gunner.

A further very essential distinction between the greater and lesser white-fronted species is the fact that, in the latter, the folded wings considerably overlap the tip of the tail, which is especially clearly to be seen in live birds (as positively asserted by Mr. Finn), while in living specimens of *A. albifrons* the tips of the wings only very slightly extend beyond the limit of the tail-feathers, and more often do not reach their tips. I speak here of live birds, as from dry skins or stuffed specimens it is far more difficult, or even almost impossible, to judge of this point.

With regard to the supposed somewhat larger dimensions of eastern examples, it is to be presumed that this is only a consequence of the fact that a far less number of western individuals have been measured than of the former. But even granted that the

[1] Here it must be borne in mind that the lesser white-fronted goose is known to Dr. Sushkin not only from the Turgai district but also from the Ryazan Government.

eastern specimens are really somewhat bigger than the western, this difference is so insignificant as hardly to merit serious attention.

Geographical Distribution

Once we unite the eastern and western lesser white-fronted geese, we may in general terms define its breeding-grounds as follows. First of all, it nests in Lapland, but has not (yet?) been found on Kolguev. Although it has not been recorded by any observer from Novaia Zemlia, it certainly breeds there, as Vasilov has brought thence a specimen of the adult male.[1] Further, it breeds in the Kaninsk Peninsula, and, probably, throughout the whole tundra of the northern coast-line of Siberia.

Palmén quotes it for the northern littoral of Siberia as follows: lower course of Yenisei—60½°–70°; Boganida—70°; valley of Taimyr—72½°–74°; west coast of Taimyr Peninsula—73½°; lower reaches of Lena—72°–73½°; estuary—71°; north coast of Chukchiland—67° N. lat.; and there is no doubt that from the Kaninsk Peninsula, through Yalmal and to the Yenisei, it breeds wherever convenient spots occur. It also nests in Kamchatka.[2] As is justly observed by Mr. Buturlin in his *Dikie Gusi R. I.*, the migration routes of the lesser white-fronted goose in European Russia are as yet little investigated, and what we know of them is still not fully established. This goose passes over all Finland, where I have had occasion to observe it in considerable numbers on its autumn migration; it also occurs on migration in Livonia and near St. Petersburg, as well as in other parts of the St. Petersburg Government, and in those of Archangel, Olonets, Novgorod in Poland and Middle Russia; I have also seen vast numbers every autumn for 18 years in the neighbourhood of Taganrog. Here it is often long detained in autumn together with the white-fronted goose, with which it feeds and passes the night in the same spots. Undoubtedly it also occurs on the Sivash in autumn and winter, as Radde, speaking of the white-fronted goose, remarks, "on the Sivash many of them were very small-sized," which leaves no doubt in my mind that these "very small-sized" birds were of the lesser species, and, probably, from the same mass which in autumn keeps in the Azov district sometimes till the end of November. If it winter on the Sivash, then, especially in hard winters, when almost all the geese move thence to the south, it must certainly visit the more southern coasts of the Black Sea, so neglected by ornithologists. The passage of this species along the Volga and Kama, disputed by Buturlin, I think requires further investigation, as it is far from ascertained, and I fully admit the possibility of its occurring in some years and being almost unknown in others, especially if on any line of migration there are no resting-places, so that the geese, escaping the guns of the fowlers, may easily fly past unnoticed.

Whether it abounds or not on the Ilmen (Novgorod Government) I cannot say, but that it is there a bird of passage is proved by a specimen which served as the original for Plate 5 of this book, as well as by several other examples seen by myself in St. Petersburg and also sent from thence. In the Moscow Government it is not mentioned by F. K. Lorenz; but this district is avoided in its flight not only by this goose but also by its congener *Anser anser*.

From the Ryazan Government it is cited (without any foundation, as a variety of

[1] Now in the Zoological Museum of the Imperial Academy of Science of St. Petersburg.

[2] That Dybowski failed to find it in Kamchatka is far from proving that it does not nest there. This species was found in Kamchatka by Steller.

the white-fronted goose) by the late Mr. Khomyakov, and, as we have already seen, by Dr. Sushkin.

As regards the Kharkov Government, however strange it may seem, this bird was not met with by Mr. N. N. Somov.

Before speaking of the Siberian birds, I will touch briefly on the visits of this goose to Western Europe, where it is also not easy to note its appearance. It rarely wanders as far as Great Britain, where Mr. Abel Chapman shot an undoubted specimen of this species on September 16, 1886. There is, however, evidence of its straying to England before this, but these cases are not fully established. It has been observed in Germany, Holland, Belgium, France, Spain (in Seville, according to Lord Lilford), and probably from time to time it appears throughout the whole of Western Europe, either in the late autumn or in winter. Its occurrence is more regular in winter in Greece and Turkey, and it has been found in North Egypt.

As to lesser white-fronted geese in Northern Siberia, their winter haunts are the Caspian and the valley of the Atrek, where they were observed, as we shall see below, by Zhitnikov. The species undoubtedly winters in Persia, in small numbers in India, in South China, and in Japan. On passage, it is met with in the Transural, in the Turgai district, and generally in the greater part of Western Siberia, but neither in the Altai nor in the Thian-Shan has it been seen on migration; and, apparently, neither does it cross the range of the Caucasus (Radde), so that it seems to avoid mountains generally. It is very common on Lake Baikal, in Mongolia, Dauria, and the Ussuri district.

Przewalski saw it in very large numbers passing over Lake Khanka. By what routes it flies to winter in Japan and South China is as yet difficult to determine, mainly because the unfortunate confusion between the greater and lesser white-fronted geese makes it now almost impossible to ascertain the exact lines of migration of this species not only in Asia but in European Russia.

Regarding Turkestan I can say nothing positive, but it is very probable that this species passes through that area by several routes, and in larger numbers than we think; so far, however, it is only known from Issyk-kul.

In the Orenburg Government its numbers are insignificant. On the whole, it will take no small amount of data and time to clear up the lines of flight of the white-fronted goose in Russia, unless sportsmen will come to the aid of ornithologists, which would be so easy for them to do almost without any expenditure of time or labour. As, however, to the explanation of Prof. M. A. Menzbier, that this species, in order to appear on passage in Poland, the St. Petersburg Government, and Finland, may arrive from its Atlantic and South Baltic winter quarters, such a view is perfectly unintelligible to me, but this may be a slip of the pen of the author.

Of the habits of this goose, on the whole, very little is known; and I can only quote the more important statements of those few authors who have not confused it with the larger species.

Dr. Sunström communicated to Mr. Dresser that, according to Lieutenant Widmark, this goose nests in Lapland in localities in the neighbourhood of which the ice holds during the whole time, and that it breeds in considerable numbers; but he gives no details. Lieutenant Widmark says that these geese moult about July 1, and he saw a flock in full moult at the beginning of August. When moulting, they collect in large

flocks, and visit spots where the ice never completely disappears, and although then quite incapable of flight, are so wary that they easily escape from pursuit by running.

The eggs collected in Finmark by Messrs. Wolley, Wheelwright, and Meves, and preserved in the British Museum, are 68.5–83 mm. (=2.70–3.27 in.) long, with a diameter of 45.7–49 mm. (=1.80–1.93 in.). The clutch is sometimes four, but also five and six (Collett). It must not, however, be supposed that this is the limit. The colouring of the eggs is light yellowish, and the shell is smooth and rather glossy. On the eggs of one of the above-mentioned clutches in the British Museum, it is recorded that they were gathered in June; and on the Boganida a young bird in down was taken by Middendorff as early as June 23, and on July 29 another was captured, in which the primary and secondary wing-feathers and scapulars had only just begun to show.

During great migrations these geese usually form in file in the shape of an oblique or sloping line, but at times in a wedge, like other geese. On short journeys, and when flying out to feed and home again to their night's lodging, lesser white-fronted geese mostly fly in a disorderly compact crowd, uttering the while their cackle, which is less loud than that of the larger bird. I often saw them flying with the latter both to water and to the steppe to graze, but I never noticed the flocks mixing. Many times I saw them together on the river Mius, in the Armenian steppes between the river Sambek and the Don mouths, and I shall never forget their innumerable flocks covering, in late autumn, the sand-flats of the Mius estuary, and then flying to feed, partly to the neighbouring corn-fields, partly to the high grass of the steppe.

I could never even approximately count the number of separate flocks appearing in autumn, in such continuous streams did they pass, one after another, whichever way I looked, filling the air with such loud cries that, even now, after many years, the ring of them still haunts my ears.

Both species alighted together on the fields, covering wide spaces of green corn, stubble, meadow, or high grass with an unbroken dusky mass. I remember how one year on an estate near Taganrog these flocks caused considerable damage to the corn, tearing up young shoots of winter crops (the autumn was rainy and the black earth very sodden), so that it was actually necessary to send three horsemen to protect the crops and drive off the countless masses of unbidden guests. I spent much time striving to stalk these birds, but almost always in vain; and only from the cover of specially dug pits, whither I betook myself before dawn, did I succeed in bringing down a few of these wary geese. To-day, recalling the past, I think with regret what success would have attended my efforts had I had recourse to the American method of shooting these birds, namely, by setting up dummies as a decoy near the ambush, especially iron profiles, so easily made by any one. But I then knew nothing of this method, and, to tell the truth, I should hardly have found time for it, as, simultaneously with the passage of these geese, were flights of woodcock, snipe, and jack-snipe, in the pursuit of which I was then wholly absorbed.

If, however, as stated in the section on the larger species, the lesser white-fronted goose traverses the Azov district in such vast flights in autumn, on the other hand it is hardly to be seen in spring. Either, on the way to its breeding-grounds, it flies very high and does not alight at all, or it takes another route, as the number sometimes seen during the spring migration is perfectly insignificant compared with the huge autumn hosts.

In view of the extreme interest attaching to the observations made by Zhitnikov

on this goose in the Valley of Atrek[1] during its winter sojourn, which are unique in respect to this species, I venture to insert quotations from his article, feeling sure of the assent of the author. "Of the two species of wintering geese, a certain difference appears in their mode of life between the kazarka[2] and the grey-lag. When the aryks (irrigating channels) overflowed their banks in December, and towards the end of the month caused floods in the steppe, the grey-lags, which hitherto had lived in the rushes, removed to the flooded land, and there passed the whole winter, making scant use of the rushes even as a night shelter; while the lesser kazarka, although also feeding in the steppe, yet invariably flew back to the rushes to drink and pass the night, keeping near the bed of the river; the grey-lags, however, settled only in the outskirts of the reed-beds fringing the washes from the aryks, situated in the steppe a considerable distance from the Atrek.

"Early in the morning, with the first gleams of dawn, the kazarkas would raise a loud cackle in the rushes, continuing the same without break for several minutes, and then, with a din baffling all description, would rise almost all in a body, and after circling several minutes above the rushes, fly off at a great height to the Persian meadows, to feed on the fresh grass. Sometimes a few flocks flew to the lake in the Russian steppe, probably on account of the convenience of having a drinking-place near at hand; one or two flocks even obstinately keeping to the lake as their residence. The most precious moment for the fowler was the early morning, when the geese rose from their resting-place and flew rather low above the rushes. About an hour before dawn I usually brought my boat stealthily into a thicket of reeds on the line of flight of the geese, and waited for them there, feverishly clutching my gun as I listened to their ceaseless clamour.

"I should here note a strange feature in the character of the kazarka—its irrepressible curiosity.[3] Several times, having noticed on the wing the edge of the boat showing dark among the reeds, or hearing when it was still dark a suspicious rustle due to my movements, they would make a point of flying towards me at earliest dawn, making straight for the spot where they had heard the noise. Once, on a misty morning, a flock which was resting on the river bank heard the splash of the oars, and, having detected my boat, flew up and made off in my direction, keeping just above the water. Meanwhile, there being no possibility of concealment, I awaited them sitting motionless in the boat. The whole flock flew to within sixty paces of me, only swerving aside after two of their number had fallen to my gun.

"I took advantage of this peculiarity of the birds, and, having crept into the reeds, would rap lightly with the oar on the side of the boat, while it was yet dark; the kazarkas thus disturbed would set up a loud cackle, and, rising in a hurry, rush headlong towards me. Of course they pretty soon learned to be shy of all strange sounds from the reeds, but, to tell the truth, they acquired their experience at the cost of many a good right and left on my part.

"On the Persian side of the river the geese would feed a fairly long time, afterwards (usually about two or three o'clock, rarely earlier) flying forth, the whole horde together, at an inaccessible height, to the very bed of the river to drink. Before doing this they would execute a whole series of evolutions, throwing themselves vertically downwards from a dizzy height, then soaring gently up and again rushing down headlong, making a half-

[1] *Psovaya i Ruzheinaya*, 1900.

[2] This is said of *A. finmarchicus*.

[3] Curiosity is, however, a trait belonging to several other species of geese, as we have already said in the Introduction.

circle in a horizontal plane just above the water, and finally alighting either some few hundred paces from the stream of the Atrek in the shallow water of the washes or straight on the oozy banks.

"Here they would pass ten to fifteen minutes in all, and, again soaring up high into the air, fly back to Persia. At five to six in the evening the kazarkas again set out for the marshes to spend the night; flying, however, lower, so that, having posted myself in their line of flight, I sometimes succeeded in bringing down a bird or two.

"The kazarkas always passed the night on open water, among the flooded reeds, mostly near the river-bed, and sometimes on its bank. On bright moonlight nights they were very lively, chattering among themselves the whole night; on rainy nights, on the contrary, they remained silent, ruffling up their feathers, and even sometimes passing such nights in the steppe, where they were probably less disturbed by the patter of the rain than in the reeds—a habit they have in common with the grey-lag.

"The kazarka, like every other goose, is hard to kill; I had to use No. 0 and 1 shot, and even then lost many wounded birds."

The author goes on to quote the dimensions of the birds of this species he killed, from which it appears that the length of the specimens varied within the limits of 22.62 and 24.40 in. (=574–619 mm.); the wing was mostly 14 in. (=355 mm.).

Farther on, this author says that "the ring around the eyes was yellowish orange, and the bill dark flesh-colour, but brighter and more rosy than in the grey-lag, with a whitish nail."

As regards the wintering of this goose in the neighbourhood of Leukoran I prefer for the present to say nothing, on account of the presumption, stated above, that Radde confused it with the white-fronted goose, although the fact itself is undoubted, as is clearly testified by the figure of the head of this species, with culmen 35 mm. (=1.37 in.), on p. 444 of *Ornis Caucasica*.

In some respects my information with regard to this goose is in direct opposition to certain statements of Prof. Menzbier, who says in *Ptitsy Rossii*: "In Central Russia the lesser white-fronted goose is only a straggler, which is connected with the fact that it does not winter on the Black Sea. On the other hand, this bird winters in great numbers on the Caspian, and it is therefore not surprising that it is commonly met with on passage thence along the Volga and Kama to Western Siberia or *vice versa*." Farther on, the reader who has studied the present notice will see that Prof. Menzbier's view, "that, except in size, it is in no way distinguished from the preceding species" (*i.e.* the white-fronted goose), is diametrically opposed to mine, seeing that the structure of the bill, the yellow ring round the eye, the difference in the shape and size of the blaze on the head, and the general darker brown colouring of the feathering of the upper surface of the body, completely separate this species from the white-fronted goose, even on a superficial inspection.

In conclusion, I may indicate the reason why I find it necessary to recognise *Anser finmarchicus*, Gunner, as the name of this species. In Knud Leem's book, cited in the synonymy, we find Gunner's description, which undoubtedly refers to this bird, while Linne's description has as much to do with it as with the white-fronted goose of the Old and New Worlds.

Here is Gunner's description of *A. finmarchicus*: "Haec minor species vulgo Finmarke Gaas (Anser Finmarchicus) dicitur et multo minor est Anate Ansere, vel magnitudine Anatis mollissimae.

"Rostrum ejus etiam brevius est rostro Anatis mollissimae et Anseris feri: immo posterioris rostrum duplo majus et longius est. Frons alba, unde et linea alba descendit basin mandibulae superioris utrinque attingens.

"Caput et collum fusca vertice nigriore. Nigra sunt tempora. Genae autem et inferior juguli pars colore aliquantum dilutiores sunt. Subtus multae sunt nigrae maculae. Rostrum flavum est et pedes sanguinei sunt.[1]

"Vix dubium super est quin Anser hic noster finmarchicus jam a me descriptus sit Anas erythropus cinerea, fronte alba, fñ. V, 116 et Anas Helsingegaas apud Clusium in exot. p. 368 n. V, nec apud Lucam Debes in Faeroa referata, p. 132 et quidem secundum descriptionem linnaeanam in fn. f. V speciatim hujus femina. In Ornith. Brünnichii p. 13, No. 54 de varietate Anseris feri e Cimbria mentio fit, fronte tota alba, abdomine nigro maculato; quam varietatem a nonnullis minus recte Trappe Gaas vocari laudatus Auctor meminit. Haec adeo Anserem nostrum finmarchicum seu Anatem erythropum refert, ut facile utramque pro eadem haberem si varietatis Brünnichianae magnitudo id permittat."

[1] Evidently from dry skins, in which, in the majority of cases, the legs and feet in drying become of a dark flesh-colour of varying depth.

Genus *Melanonyx*, Buturlin (1901)

Before proceeding to describe the various species and races of geese for which Mr. S. A. Buturlin in 1901 established the genus *Melanonyx* (as a sub-genus), I consider it advisable to discuss the validity of this group, and at the same time to give a short sketch of the same, since it is impossible to do this when describing its individual members. This is mainly owing to the fact that these geese have been so mixed up and confused, not only by sportsmen, but by the majority of ornithologists of all countries, that it is now almost impossible to unravel the entanglement; and to refer any of the recorded observations to species with which they perhaps have nothing to do would be worse than to pass them over. There are, of course, exceptions, and wherever it has been found possible to refer with certainty observations to the proper species, the reader will find them in their place in notices devoted to such species.

First of all, I may state that I regard *Melanonyx* as rightly distinguished and properly characterised by the author of *Dikie gusi Rossiiskoi imperii*, and, moreover, that it is entitled to full generic rank. In one detail the definition of the genus given by the author leaves room for emendation. Mr. Buturlin writes: "Anseris sub-genus novum, rostro carneo aut flavescente aurantiaco, basi dertroque nigris, *fronte fusco-grisea, albo non fasciata*, abdomine griseo, nigro haud fasciato."

The character I have underlined in this diagnosis is not applicable to the whole genus, and even in the adult yellow-billed bean-goose the feathering at the root of the upper mandible is almost always white, while in certain other species it is sometimes white, either in the form of a more or less broad fringe, or white patches. As regards the yellow-billed bean-goose, the white feathering on the forehead at the base of the upper mandible sometimes attains a breadth of as much as 15 mm. (= 0.59 in.).

Only in the first year or two, and again in very old age, in this species, are the white plumules bordering the base of the bill ever completely absent, as has been demonstrated by observations on specimens kept in captivity in the course of several decades. Moreover, the white feathering either in the shape of separate plumules or in the form of a definite patch of varying size, or occupying the mental angle, or even, as an exception, the whole chin, is met with occasionally in *M. arvensis*, *M. segetum*, *M. segetum serrirostris*, *M. mentalis*, and probably some others.

As to the black nails of both mandibles and the black base of the bill, in connection with the coloured band on the bill and the absence of black patches on the under-parts, these characters are quite constant, and sharply distinguish the group *Melanonyx* from all other grey geese. Indeed, only in very old individuals of the yellow-billed bean-goose is the whole bill to the base occasionally yellow-orange, and then only on the culmen, between the nares, is a black longitudinal band retained. It should be added

that, in contradistinction to the representatives of the genus *Anser*, in the species of the genus *Melanonyx* the teeth along the edges, in those spots where the mandibles are coloured black, are of a dark instead of a light hue.

In view of the similarity of colouring and arrangement of the pattern of the colouring occurring in all the species of this genus, with the sole exception of the short-billed goose (*Melanonyx brachyrhynchus*), it would sometimes be difficult, or even impossible, to determine from skins alone to which species they belong, were it not for the bill, which almost always permits us to decide with which goose we have to deal; and this, too, in spite of any alteration in colouring, which is the more important seeing that the light areas of the bill rapidly change after death.

The structure and form of the bill, the comparative size and shape of its nails, and the number of teeth along the tomia of the upper mandible afford, for the most part, such constant and decisive characters that, when taken together, they fully suffice to discriminate the species and sub-genera of *Melanonyx*. I therefore discuss in great detail —perhaps in too great detail—the bill of each representative of this genus under its respective heading. To the importance of the bill distinguishing the species of this group of geese I was led by the studies of Mr. Naumann, who with great care analysed the various differences in the structure of the bills of the yellow-bill (*M. arvensis*) and common bean-goose (*M. segetum*), so that I had only to verify his investigations and deductions in relation to these two species and strive to apply them to the other members of the group. In doing so, I succeeded in finding a few additional characters which strongly confirm the truth of Naumann's deductions.

Mr. Naumann's investigations are therefore of great importance, since it was owing to these that it became possible to discover the connection which exists between certain East Siberian and European geese of this group. It is true that one of the characters given by Naumann, namely, the number of teeth along the edges of the upper mandible, proved wanting in constancy when examining a large collection, but in the majority of cases even this character may afford great assistance in discriminating species.

Here it may be remarked as strange that, down to our own time, scarcely any ornithologist has estimated at its true value the important difference in the bills of the yellow-billed and the common bean-goose, pointed out by Naumann. Much confusion in the literature on these birds would have been avoided, and our acquaintance with the geographical distribution and mode of life of the members of the group would have been increased, had this been known earlier.

Despite all that has been written by Naumann on the bills of these two geese, the majority of ornithologists seem to believe that the whole point of these distinctions consisted in a different arrangement of the black and yellow-orange colour; and as colour alone here plays a secondary part (unless taken in connection with structural characters), the confusion which Naumann had done so much to abolish was revived.

Such a state of the "goose question" produced further unsatisfactory consequences; so that, for example, the late Mr. Seebohm latterly affirmed that *M. brachyrhynchus* was nothing more than a slight variety of the bean-goose (*M. segetum*). Even the totally different colouring of the whole bird, to say nothing of the bluish ashen-grey wing (recalling rather the grey-lag than other representatives of the genus *Melanonyx*), did not save that eminent ornithologist from a serious error. This view of Seebohm, to my astonishment, was finally shared by other ornithologists, among them the late Mr. John Cordeaux.

Owing to this state of affairs, the data on the range and habits of the geese of the group *Melanonyx* are so confused that, in the majority of cases, it is impossible to refer them with certainty to any particular species; and accordingly they are given here only in their most general features, and have been almost entirely omitted in the descriptions of the species.

In the main, bean-geese are natives of the Far North, and only in Siberia (chiefly eastern) does the region of their nidification descend considerably lower than in more westerly countries. This, perhaps, is explained partly by the severity of the Siberian climate, and partly by the fact that in Europe these geese have been driven back northwards by man or, more probably, by the reduction, due to cultivation, of free and suitable spaces, so necessary for such shy birds. "The bean-goose," writes Professor Menzbier, "is an extremely cautious bird, and knows well how to avail itself of its strong and rapid flight, as also its skill in swimming and diving, to escape danger." This is perfectly true, as appears from the following observations on the extraordinary capacity of this goose for diving.

Once, during the autumn migration, on one of the lakes in Finland (Vyborg Government), I succeeded in knocking over with a charge of slugs a goose of this species from a flock flying high overhead. Having fallen with a loud cackle in a somewhat inclined direction, the bird, evidently only slightly touched in the wing, splashed heavily against the surface of the water some 70 paces from my boat and at once dived. A few seconds later it came up again, at not less than 200 paces; in other words, it only required a few seconds to swim this distance under water. Having dived again, it reappeared on the shore of the lake, 400 paces off, and hid in the sedge. All this happened with such rapidity that, had I not been myself the cause and witness of the occurrence, I should never have conceived the possibility of such rapid motion under water; for this goose surpassed all I had hitherto seen of the kind among waterfowl. Once, indeed, I remember a cormorant, which I had wounded, behave in a somewhat similar manner under water, eventually escaping as quickly as did this goose.

As to the wariness of the geese of the group *Melanonyx*, I have come to the conclusion that all geese without distinction are equally wary, once they have recognised danger, despite the fact that they are comparatively confiding before making acquaintance with man.

In a later passage on this goose, Professor Menzbier remarks that: "Its voice hardly differs from that of the grey-lag, and the bird makes use of it by imparting to its ordinary cry various modulations according to the different exigencies of its life."

Personally, I must own to being familiar in this group only with the note of *M. arvensis*, which indeed varies greatly according to circumstances. Thus the usual *gagá-gagá* or nasal *gonk-gónk-gónk-khónk* is sometimes uttered only once as a sonorous, deep *khonk*, and is very different when uttered by the bird on the wing or when the flock is sitting on the water. The quiet cackle again differs from the alarm-note; and the low chatter of a peaceful flock has a character of its own. Although I do not doubt that considerable differences in the cries of different species of this group of geese exist, I deny the possibility of expressing in letters any one of these sounds. Personally, I can distinguish without fail the cackle of a flock of white-fronted geese from that of a flock of *M. arvensis*, and any observant fowler can of course do the same; but no one, I think, is able to express in words the differences of these sounds.

As regards the food of the bean-geese, Professor Menzbier writes that they are

exclusively herbivorous birds, which graze on young crops. To this, however, it should be added, not only on young crops but also on corn-stubbles, in rice-fields, and in general wherever any garden or other cultivated plants have grown, these geese are able to make a living; and that as goslings they also eat animal food in the shape of insects, snails, crustaceans, and even fish-roe. In summer and autumn, like all other geese, they consume in large quantities all kinds of berries, especially the bilberry, of which there is no lack on the tundra. The summer life of the bean-geese is almost entirely unknown. In fact we only know that the broods begin to combine very early into more or less considerable flocks, and that towards the moulting season of the old birds, that is, when the latter begin to lose their flight-feathers, and the goslings are not yet fledged, the wanderings of the flocks (sometimes several hundreds strong) to considerable distances on foot commence. That the geese seek at this time more remote and retired spots in which to pass this most trying and dangerous period in their life is beyond doubt. Such movements do not, however, constitute a peculiarity of the geese of the genus *Melanonyx* alone, but are common to the majority of other geese. We have already seen, for example, that this tendency to wandering manifests itself with still greater force in the grey-lag goose; and it is common to other kinds.

The well-known sketch of such a migration of bean-geese in Mr. Seebohm's *Siberia in Europe*, which was taken in the Pechora district, is very graphic, but loses almost all its interest and importance owing to our ignorance of the species to which it refers, as these might be yellow-billed or common bean- geese, the author making no distinction between the two forms.

It is a bad look-out for the geese if, during such a migration, they are observed by man. The Samoyeds and other Siberian natives at such times supply themselves with goose-meat in enormous quantities, so that their store is sometimes more than sufficient to feed not only themselves but their dogs too for the whole year and more. This distinction is, however, by no means confined to the bean-geese, but is shared by the whole anserine tribe, wherever it has man for a neighbour.

Further details of the summer habits of this group of geese are lacking, but judging from a few observations made in East Siberia we may conclude that, from the first essay of the goslings at flight, there commence the movements of separate broods or flocks for the fields to feed, and these continue during the autumn and winter.

These geese ordinarily go afield twice in the twenty-four hours, returning to the water in the day and again for the night. Often, however, they fly in the daytime to rest on water other than that where they pass the night. This, however, is not always so, and I know for certain a place in the south where white-fronted geese resort together with bean-geese (although these are few) for their daily rest and nightly shelter to the same extensive estuary.

"The winter life of the bean-geese," writes Professor Menzbier, "is monotonous in the extreme. By day they feed in the fields and in the steppe, and fly away for the night either to those parts of rivers which do not freeze, or to the sea."

I may add that, during the daily rest, the bean-geese do not stay long on the water, and, where possible, having drunk their fill, swim off to the shoals or land on sandbanks or islands. During rest, and when feeding, these geese throw out sentinels, from time to time relieved by others, which have already rested or satisfied their hunger. Sentinels are also placed at night to watch the sleeping flock.

Neither on the sea nor on lakes and rivers do geese pass the night on open water, but

having swum about and chattered among themselves, the flocks either swim into the growth along the banks or push out on to the shoals, to spend the time in rest, till the first gleams of the rising sun. Only for want of such spots do scared flocks in rare cases pass the night on open water.

Bean-geese nest either on the tundra or on the shores of lakes, some species preferring those near woods, for the most part making the hollow for the nest on the top of a tussock of grass. The depression is lined first with grass, generally dry, and above with the bird's own down.

The number of eggs in a clutch varies from three to six,[1] but I think that sometimes the latter number must be considerably greater. Further information with regard to the eggs will be found in the Appendix.

In the only geese of this group (*M. arvensis*) which I have personally observed, in Finland in September and October, the daily life was as follows. At dawn they flew from their night shelter on the shore of the lake to the adjacent fields, and towards ten o'clock returned to bathe in the water (always in the shallowest parts of the lake near the shore), and to rest for an hour or two. After complete quiet and silence in the flock, some of the geese would begin to chatter, at first in a low tone, singly, then the sound increased to a noisy clamour, as if the whole flock was engaged in a wrangle; at times the entire assembly would rise into the air with a loud cackle, striking the surface of the water with great force on getting up, and after describing a small circle or two in the air, again descending to the spot whence they started, when, little by little, their cries would again subside. About four o'clock, with a fearful and combined din, caused by the blows of hundreds of wings upon the water, the geese would all rise together, sometimes two or three large flocks, that had been resting side by side, and set off once more to the morning grazing-grounds, or at any rate in that direction. If no one disturbed them, the flocks would always journey by the same aërial route. By this manner, having well noted the routes, and having concealed oneself behind shelter on their line of flight, one might with assurance await their return,—a device to which local fowlers of course have recourse.

In general, this habit of constantly pursuing one and the same line of flight is strange and difficult to explain. It occurs not only among geese, but among many other birds, as, for example, bustards, grey partridges on the southern steppes, swans, etc. I was always struck by this phenomenon, when I lived in a locality where I often saw the passage of birds in great masses, especially during spring migration. It is also interesting to note that these routes sometimes remain constant during a long series of years.

During the long hours passed in a skiff hidden in a mass of reeds or in a shed, waiting for swans, geese, or ducks, I have often thought over this question, trying to find an explanation. Possibly I have obtained a clue, although it would be premature to disclose inferences founded on incomplete observations of the facts of the phenomenon.

Bean-geese, mainly *M. arvensis*, fly pretty freely to decoys, if the latter are not far removed from their line of flight, and thus, owing to their curiosity, often become the victim of the fowler. It is still better if the decoys are provided with live geese attached by strings. This method of taking geese is regularly practised here and there in many parts of Russia, as, for example, on Lake Ilmen, on the Surgut, and in other places, but unfortunately there are hardly any detailed accounts of this form of capture. It seems, however, that it is almost a matter of indifference whether the decoy birds are made to look

[1] Six is a full clutch, *e.g.* for the yellow-bill (*M. arvensis*), according to Göbel for Lapland and the Otonets Government.

natural or not, provided their colour be approximately true. The more life-like they are, however, the better is the chance of their attracting the geese. If the decoy be arranged on land, somewhere near the feeding-grounds of the flock, it is sufficient to make mere profiles of geese, of iron or other material, painted as near as possible the colour of nature.

For further details concerning the geese of this group, however scanty, the reader may refer to the separate headings of each species.

In conclusion, I desire once more to direct the attention of future observers of geese to my conviction that, at least in the species of the genus *Melanonyx*, the number of teeth along the edges of the upper mandible increases with age, that is, that in the young there are somewhat fewer of these teeth than in full-grown birds.

SUSHKIN'S GOOSE

Melanonyx neglectus, Sushkin

Plate 7

English—*Sushkin's Bean-Goose; Pink-footed Goose* (erroneously for India?); *Large Pink-footed Goose* (Frohawk).

Russian—*Ufimski gumennik* (Buturlin); *gumennik krasnonosy* (Menzbier).

Anser neglectus, Sushkin, Bull. Brit. Ornith. Club, v. p. vi. 1895; *id.*, "Ibis," 1897, iii. p. 5; *id.*, Ptitsy Ufimsk. gub., 1897, p. 69; Madarasz, Gyulá-tól, Természetrajzi Füzetek. Kötet., xxiii. 1900, p. 75 (Ungar, Ornis); Karamzin, Pt. Bugur. i dr. uyezd. i Beleb. u. Ufim. g. (1901), p. 181; Buturlin, Sinoptich. tabl. Okh. Pt. Ross. Imp., p. 43 (1901); *id.*, Opred. Plastinch. ("Psov. i Ruzh. Okhota," 1900); Oates, Game Birds India, ii. p. 75 (1899); Menzbier, Okh. i Prom. Pt. Ross. i Kavk., p. 470, pl. 135 (1902); Buturlin, "Po Severu Rossii" (Zhitkov i Buturl.), 1901, p. 84; Sushkin, MS. letters to Author; Frohawk, "The Field," 1902, Dec. 20, p. 1045; Sorokin, V., O prolete gusei, "Psov. i Ruzh. Okh.," Jan. 1903, pt. iii. p. 113 (Ryazansk. gub.); Semenov, "Rossiya," ii. chap. iii. p. 104 (1902).

Melanonyx neglectus (Sushkin), Buturlin, Dikie Gusi Ross. Imp. ("Psov. i Ruzh. Okhota," 1901, Feb.-April); *id.*, sep. impr., p. 27 (1901).

? *Anser obscurus* (Brehm), Severtsov, Vert. i Goriz. Raspr. Turk. Zh., p. 149 (1873).

? *Anser segetum* (*partim!*), Trevor-Battye, Ice-bound on Kolguev, p. 423 (1895) (*Rostro pedibusque subroseis vel carneis*).

? *Anser brachyrhynchus*, Hume and Marshall, Game Birds India, iii. p. 71 (1880); ? Blanford, Fauna Brit. India, iv. p. 418 (1898); ? Oates, Man. Game Birds India, ii. p. 65 (Pink-footed Goose) (1899); ? Finn, How to Know the Indian Ducks, p. 17 (1901).

? *Anser medius*, Cordeaux (*nomen nudum*), Brit. Birds, their Nests and Eggs, pl. 15, p. 68 (1896).

?? *Anser oatesi*, Rickett, Bull. Brit. Orn. Club, xi. p. 46 (1900-1901).

Dr. Sushkin, who first discovered and described this species of goose, has kindly allowed me to make the fullest use of both the description of the bird itself and the observations made on its habits detailed with such a masterly hand in his *Ptitsy Ufimskoi gubernii*. I have been compelled to avail myself very freely of this permission, although the greater part of that author's article has already been reproduced in several journals, and by Professor Menzbier in his *Okhotnichi i promyslovya ptitsy Yevropeiskoi Rossii i Kavkaza*, where this goose was figured for the first time.

"This species is distinguished from *A. brachyrhynchus*," writes Dr. Sushkin, "by greater size, longer and more robust bill, and by the fact that the secondary coverts are black-brown, and thus of another colour to the main coverts. From *A. segetum* it is distinguished by the dark flesh-colour of the legs and median part of the bill.

"As concerns the colour-differences of the plumage of the new goose from *A. segetum*, the colouring of the head and neck is darker than in the latter, and the margins of the feathers of the upper side and of the dark feathers of the flanks of the body are browner.

In some specimens, just as in *A. segetum*, is observable a slight admixture of white feathers at the very root of the upper mandible."

This comparatively short description is quite sufficient to indicate the main differences in the plumage and the colouring of the bill of Sushkin's goose from its congeners—the bean-goose and *M. brachyrhynchus*. But, regarding the structure of the bill, it will not be superfluous to add the following details, as they will allow of the discrimination of this goose from dry skins, the bills of which have lost their original colouring. Thus the bill of Sushkin's goose is comparatively weak and narrow; from the bill of *M. segetum* it is distinguished by its far less depth at the base, and in particular by the feebler lower mandible, of which the greatest thickness visible from without, when the beak is shut, varies between 6 and 6.5 mm. (=0.23–0.25 in.). In an adult *M. neglectus* and in a young female in first plumage this dimension was only 5.5 mm. (=0.21 in.), while in all the specimens of *M. segetum* examined the greatest depth of the lower mandible under the same conditions varied between $7\frac{1}{2}$ and 11 mm. (=0.29–0.43 in.). A still more marked difference is presented by the shape and comparative size of the nail on the upper mandible; but to describe this distinction is more difficult than to express it by a sketch, which I have accordingly done.

As to the number of teeth on the sides of the upper mandible (a feature on which I laid great stress when I began to study the geese, but which I afterwards had to acknowledge to be lacking in constancy), this varies in adults between 25 and 28, while in two young specimens I found 23 and 24 of these teeth respectively, which again convinces me that the number of teeth in geese increases up to a certain age. It is thus evident that, in freshly killed birds, when the colouring of the soft-parts has not yet lost its true tint, Sushkin's goose may be distinguished from all its nearest kin without any trouble, and if there exist a resemblance, in the colouring of bill and legs, between this goose and *M. brachyrhynchus*, the dimensions of the bill and different colouring of the wing-coverts of the latter will at once afford a distinction.

In his description of this goose, Dr. Sushkin mentions the fact that in certain examples, "as in *M. segetum*, there is observed a slight sprinkling of white plumules at the very base of the upper mandible."

In the notice of *M. segetum* it is stated that I have personally never seen these white feathers in specimens of this latter species; but, as appears from the above remarks of Dr. Sushkin, as well as from the observations of an individual fully competent to discriminate between the bean-goose and the yellow-bill, whitish but not white or grey-white feathers are sometimes to be met with at the base of the upper mandible in the bean-goose. Although I have no right to doubt this statement, I must suppose that, if such white or whitish plumules are to be met with in the bean-goose, it is only in a very limited number, not comparable with what we see in the yellow-billed goose. I should, therefore, much like to know to what extent these white feathers may sometimes manifest themselves in Sushkin's goose, and to this point I may direct the attention of ornithologists and sportsmen.

As regards the disposition and depth of colour of the plumage in Sushkin's and the bean-goose, I have been unable to find any distinctive differences; the more so since the bean-goose is subject to very considerable variations in colour. Some examples of the latter species are, for instance, very dark, probably owing to age.

Dimensions of Adult Birds of Both Sexes

Total length	746–838 mm. (= 29.4–33 in.).
Expanse	1524–1651 mm. (= 60–65 in.).
Wing	452–485 mm. (= 17.7–19 in.).
Culmen, straight	55–63 mm. (= 2.16–2.48 in.).
Culmen, curved	57–67 mm. (= 2.24–2.63 in.).
Greatest depth of lower mandible with bill shut	6–6.5 mm. (= 0.23–0.25 in.).
Tarsus	75–79 mm. (= 2.95–3.11 in.).

Number of teeth on edge of upper mandible, 23–28.
Weight, up to 9½ Russian lbs. (Sorokin).

The annexed table shows the relations existing between certain dimensions in individual specimens. Undoubtedly, with fuller material, there will be obtained larger fluctuations than those given, and we are at present far from being able to judge of the extreme dimensions of this goose.

Sex.	Wing.	Culmen (curve).	Culmen (straight).	Number of Teeth.	Greatest depth, lower mandible, shut bill.	Remarks.
	mm. in.	mm. in.	mm. in.		mm. in.	
♂	?	?	58 = 2.28	28	6.50 = .25	Zoolog. Mus., St. Petersburg.
♂	463 = 18.2	?	60 = 2.36	26 or 25	6 = 0.23	British Museum.
?	465 = 18.3	60 = 2.36	57 = 2.24	26	?	Coll. P. P. Sushkin.
?	465 = 18.3	59 = 2.32	56 = 2.20	27	?	
?	485 = 19	67 = 2.63	63 = 2.48	25	?	
?	470 = 18.5	60 = 2.36	58 = 2.28	26	?	
?	483 = 19	62 = 2.44	59 = 2.32	26	?	
?	452 = 17.7	57 = 2.24	55 = 2.16	27	?	
♂	?	?	60 = 2.36	26?	?	Hungary. Dr. Madarasz.
♀ juv.	?	?	54 = 2.12	24	5.5 = 0.2	Persia, Seistan. N. A. Zarudny.
juv.	418 = 16.40	...	55 = 2.16	23	?	Novaia Zemlia. Nosilov.

Young Birds in First Plumage

These differ from the adults first of all by the narrower feathers of the body, as is generally the case with all young geese compared with old. Tips of feathers on neck light whitish grey. Under-parts light dingy grey, with tinge of ochreous and darker rounded grey centres to feathers; vent and tail-coverts—upper and lower—dingy white, perhaps due to dustiness of skin. Head and neck brown, with strong coffee tint.

Mr. N. A. Zarudny, the well-known explorer of Transcaspia, sent me a specimen to study, on the label of which is written: "Seistan, ♀ juv. 9/xi.: legs dingy raspberry, band on bill rosy." He informs me that the goose sent was wounded, and afterwards, with clipped wings, set at liberty for a time in the vice-consulate garden.

This specimen of Sushkin's goose shot by Mr. Zarudny has considerable value in determining the distribution of the species. In an example from Novaia Zemlia, which is probably in its first plumage (prior to the beginning of the second moult), the feathers are greatly worn and the tips of those on the neck whitish. This specimen was brought from Novaia Zemlia by Mr. Nosilov.

Geographical Distribution

However strange it may appear, yet this goose, discovered and described only in the last decade of the past century, is far from having the limited range which might be supposed. Most astonishing of all is the circumstance that such a distinct, beautiful, and apparently common goose (judging from its passage through the Ufa Government) should have escaped notice during so many years by sportsmen and ornithologists alike. Its breeding on Kolguev appears to be almost certain, while that in Novaia Zemlia is fully proved. At any rate the bean-geese of Kolguev, with rosy bills and feet, mentioned by Mr. Trevor-Battye, can scarcely be anything else than this species, as Mr. Buturlin[1] and Professor Menzbier[2] have already pointed out.

In the summer of 1902 Mr. Buturlin did not, however, find this species on Kolguev; but he was on the island when the moulting was already over and all the geese could fly, and, as is well known, it is then difficult to obtain specimens.

On the other hand, this explorer saw heads of this goose from Matochkin Shar during his expedition the same year to Novaia Zemlia, as is stated in the Appendix.

The second, but quite certain, home of this goose is Novaia Zemlia, whence Nosilov brought, as I have already stated, one specimen, now in Moscow. Further, thanks to ornithological investigations in the Ufa Government, we know that this species is common there on migration; and it was from the description of it by Dr. Sushkin that Dr. Madarasz recognised it in winter near Panskov in Hungary, where apparently it must be a not uncommon visitor, although taken by ornithologists for the short-billed goose on account of the rosy flesh-colour of the soft-parts.

Thus, Hungary may be considered either lying on the line of migration of this species or, perhaps, one of its winter haunts. Another undoubted winter resort of this species is Seistan in Persia, whence a young female was brought by Mr. Zarudny. This latter fact affords grounds for surmising that the so-called *M. brachyrhynchus* which, from time to time, has been secured in winter in India, belonged to this species, and not to the species above named, which could not possibly get there. If this be so, there can be no further doubt that Sushkin's goose must be met with on passage in various parts of the region lying between the extreme points where it has hitherto been recorded.[3] It may indeed be that *M. neglectus* occurs also in other parts of Europe, and I have grounds for believing that it strays in winter even to England. This is suggested by the circumstance that the late Mr. J. Cordeaux, in his notice of the short-billed goose,[4] states that he from time to time came across geese so different from that species and the ordinary bean-goose that he raised the question whether there might not be another race of goose—*Anser medius*—in Great Britain.

It seems to me clear that such examples could only belong to *M. neglectus* (from Novaia Zemlia or Kolguev) or to the enigmatic *M. carneirostris* of Buturlin. As to whether this species nests in the Turgai district near Urkach, as stated to Dr. Sushkin by Mr. Nazarov, nothing can now be said, and although, as Mr. Buturlin justly observes, this is difficult to admit, yet we have no right to absolutely deny its possibility. Indeed, we now

[1] *Dikie gusi Rossiiskoi Imperii.*

[2] *Okhotnichi i promyslovyya ptitsy Yevropeiskoi Rossii.*

[3] In 1902 it was got by Mr. Sorokin in the Ryazan district of the government of the same name, on its autumn passage.

[4] John Cordeaux, *British Birds, their Nests and Eggs*, pl. 15, p. 68 (1896).

know that certain species of the genus *Melanonyx* breed very far southward in East Siberia; and it is quite probable that some of the references quoted under a note of interrogation in the bibliography to the notice of the short-billed goose really pertain to *M. neglectus*, although this is now hardly possible to verify.

Moreover, it is possible, and even probable, that it is to a specimen of the latter species from the Timsk district, Kursk Government, that the passage in the first number of the *Okhotnichya Gazeta* for 1900 (p. 3) refers. "A goose," it is stated, "wounded here, lived in our fowl-yard thirteen years. It was small and neatly built, with a fairly slender neck and elegant head. Its plumage was dark grey, the bill black with a regular transverse rose-red bar a centimetre in width. This goose was wounded in the wing, but soon recovered, although it could not fly. It became quite used to captivity, and was not shy, although when trying to conceal itself from observation it would press its head to its breast."

Farther on the author continues: "He never parted from his little Russian wife. While she sat for weeks together on her eggs, he patiently stood or sat near the nest. He, however, treated his offspring inhospitably, trying to drive them away from himself and their mother. The half-wild geese reared in our poultry-yard were small-sized (although larger than the father), with rather dark-coloured plumage, and the bill half black with a light point, but lacking a rose-red ring."

Of course, it is not clear from the above passage whether the bird was a Sushkin's or a short-billed goose, as there is nothing definite in the description; but, seeing that not a single trustworthy occurrence of the pink-footed goose in Russia has been noted, while it is beyond doubt that Sushkin's goose must have lines of migration through European Russia, probability is on the side of the supposition that the rose-billed goose observed in the Kursk Government belonged to the present species. Recently, in the January number of *Psovaya i Ruzheinaya Okhota* for 1903, Dr. Sushkin in an article, "O prolete gusei," reports that he killed in September 1902 two Sushkin's geese in the Ryazan district of the Ryazan Government from two different flocks.

Accordingly, if we connect by lines the extreme points where this species has been certainly seen, that is, on the one hand, Novaia Zemlia with Hungary and, on the other, with Seistan, passing through the Ufa Government, we shall obtain a very extensive range. Moreover, if we are assured that the species strays to Great Britain, India, and even Japan (where Mr. Swinhoe speaks of it under the name of *A. brachyrhynchus*), we shall obtain an idea of the wide geographical distribution of this goose, which, it would seem, is more widely spread than its congeners.

Now that, thanks to the labours of Messrs. Sushkin, Madarasz, Menzbier, and Buturlin, the determination of this species has become fairly complete, let us hope that our information with regard to its range and habits will ere long become proportionally enlarged.

Dr. Sushkin writes as follows on the subject: "Observations on the autumn migration were carried on in the Belebeevsk and neighbouring part of the Ufimsk districts, in the environs of Asly-kul and Shungak-kul. The flocks, so far as could be discerned, were moving S.W.S. Of nine geese secured, eight, as already stated, belonged to *A. neglectus*, and only one to the true *A. segetum*. Besides this, by observing from my hiding-place the behaviour of the geese on the wing, I was able to examine carefully through a binocular probably hundreds of them, and only once or twice

did I see geese with the feet and centre of bill orange; all the rest, with the exception of stragglers of *A. cinereus* accidentally occurring in the flocks of bean-geese, were *A. neglectus*. The goose with the feet and centre of bill dark flesh-coloured is well known to the local Tatars and Bashkirs; *A. segetum*, on the contrary, is unknown to most of them, and native fowlers to whom I showed my specimen regarded it as a rare or unknown bird. Intelligent local sportsmen usually called geese with a black nail to the bill and coloured feet bean-geese, but such of them as paid attention to the colouring of the bill and feet constantly spoke of their rosy tint. Since *A. neglectus* collects in the Ufa district in enormous flocks, I think Eversmann's statements regarding *A. arvensis* and *A. segetum* partly refer to this goose. The statements communicated by Messrs. Bogdanov and Ruzski as to bean-geese occurring on the Kama certainly refer partly to *A. segetum*; but whether *A. neglectus* also occurs on the Kama is not known. It is also unknown where *A. neglectus* is found beyond the limits of the Ufa Government; but it may be averred with certainty that it is not met with either in Turkestan or near Moscow; neither did I find it in the western part of the Turgai territory, although I shot many geese there. In like manner the nesting range of this goose is still unknown. Mr. P. S. Nazarov informed me, indeed, that in the neighbourhood of Urkach, in the Turgai territory, he had observed geese breeding which agreed with the description of *A. neglectus* I sent him; yet I do not venture to regard this as evidence of the occurrence of that species, and will merely remark that in general the nesting of any bean-goose so far south is opposed to the present state of our knowledge of the distribution of these birds.[1]

"In this ignorance of its breeding range, it is difficult to express a definite opinion as to the taxonomic importance and relation to *A. segetum* of *A. neglectus*. I regret also to have to say that I did not succeed in obtaining a single skeleton, and a later attempt to get such an example from one of the local fowlers resulted in failure. In any case, it must be acknowledged that, in the first place, a passage from *A. segetum* to *A. neglectus* has not been indicated; and, secondly, that the latter form —at any rate in certain localities—is very numerous.

"Passing on to such observations on the migration and manner of life of *A. neglectus* as I was able to make, it may be noted that in spring, from April 16 to May 3, I observed near Ufa, and in the neighbourhood of Shungak-kul, flocks, at times very large, composed of some kind of bean-geese. The birds were hurriedly flying north-east, the formation of the skein being a wedge or a straight line, obliquely disposed to the direction of flight. Judging by the results which were yielded by the autumn passage, I am inclined to think that at least a considerable portion of these flocks consisted of *A. neglectus*. The autumn migration of *A. neglectus* in 1891 began on September 21, after the departure of *A. cinereus*; such a relation between the two, according to the Bashkirs, being the rule. In the afternoon of that day four large flocks of *A. neglectus* were noted, with about a hundred birds in each, flying S.W.S., the formation of one of them being a wedge, while the other three were so arranged that from each angle a line extended sideways perpendicular to the direction of flight. The call of the migrants was audible in the night; and on the following day there was a

[1] A Kirgiz told me that on Lake Cholkar-igyz-kara, on the watershed between the head-waters of the Irgiz and Tobol, a goose nests which is not *A. cinereus*. In 1894, when I was on this lake, it had already dried up, and there were no geese there.—P. P. Sushkin.

mass of these geese on the stubbles, winter-sown fields, and the steppe around Shungak-kul. Many spots presented from a distance the appearance of having been ploughed over-night, to such an extent were they blackened by the flocks of geese. On the next day there were still more birds. During the whole time it was fine autumn weather, but it became gradually colder. On September 29 I drove to Asly-kul, where, near the lake, I observed such a mass of geese as defied enumeration. The flocks flying on to the lake literally eclipsed the sun's light, and when rising from the fields dazzled the eyes, glittering like snowflakes in a storm. Towards night it began to freeze, with a clear sky and a high wind, and by the following day the geese had sensibly diminished in numbers. On October 1 I was again at Shungak-kul; the weather had changed, snow and rain alternating with clear frosty weather, which was succeeded by a thaw. The number of geese kept decreasing, and the last gaggles were observed on October 4.

"The mode of life of *Anser neglectus* during its halts while migrating is pretty simple. The geese feed in the field or steppe, pass the night on lakes and staritsas (ancient river-beds filled with stagnant water), and fly there to drink in the course of the day. Sun-rise already finds them feeding. Here and there in the stubbles and winter crops or on the steppe are scattered the grazing flocks in dark patches, and only rarely a small belated gaggle appears, the members of which, with loud cries, fly from the lake to join their com-panions. The feeding geese move slowly in one mass farther and farther, leaving the crops behind them considerably trodden down, calling all the time to each other in a low tone. The sonorous notes of the leaders are then rarely heard, and almost always indicate the approach of danger. On the fowler's appearance the geese raise a cackle, the flock rises, and if there is no shot, alights again some 150 paces farther on, as if testing the patience of the sportsman. By noon the geese are satisfied and eat more slowly, occasionally uttering a cry and preening their feathers; and, finally, the flock rises and flies to water. For the noonday drink the gaggles arrive at different times. Usually the geese may be found by day on the water between eleven and two o'clock, but if the weather be dry and the sun rather hot, they begin to fly to water from ten o'clock, while if the weather be wet, especially if snow has fallen, many flocks pass the whole day feeding, satisfying their thirst with the moisture of their damp food. A flock just arrived on the water will sometimes whirl in a circle before settling, but usually drops straight from a considerable height. It is a curious sight to behold when, in descending on the water, a goose will rush headlong downwards, executing twists and turns that might excite the envy of a duck. Not knowing this trick, I often missed the chance for a shot. The flock flies high, out of range, when all at once the geese throw themselves down with such speed as to produce a swishing noise, and rush past the gunner's hiding-place. Then the flock drops on to the water usually some distance from the shore; the geese settle, drink, bathe, and then rise and again fly to the field. Their place is at once taken by other flocks, and although each passes not more than half an hour on the water, geese are to be seen there during the whole of the time devoted to drinking, the air being filled with the hustle of skeins coming and going. The scene may be particularly well observed on some small mere, where the geese are of necessity crowded. Still more interesting is the scene presented by the arrival of the geese on the lake to pass the night. In order to get a full view of this, I lay in wait from three in the afternoon. The time for drinking was already past; only a few belated flocks were left, soon to leave the lake. To get within shot of these would be difficult; besides, firing would certainly hinder further observations. Having arranged an ambush in the reeds or bushes, I used to take

up my position, there to remain till the arrival of the geese. As will presently appear, the twigs of the ambush must be so bent or tied that the seated gunner should not be visible from above. With the departure of the last skeins, the lake is wrapped in silence, only broken by the shrill notes of titmice and buntings. From time to time flocks of ducks fly down and settle on the lake, but again one must refrain from shooting, and when the arrival of the geese is approaching, the ducks must be scared away or they will spoil everything. Geese, not only *A. neglectus*, but all species I have seen, usually settle on the water with great precautions, but, once alighted, they become quiet, and the gunner may for convenience of shooting even show himself out of his ambush, especially at dusk; ducks, on the contrary, rush headlong on to the water, and most of them, especially the common wild duck, continually keep a sharp look-out in all directions, and the moment one sees anything uncanny it begins to quack, when all remove to a distance from the suspicious object, alarming all other birds near by. About an hour before sunset the foremost goose, the leader of some large flock, appears on the lake, keeping the whole time at a height of not less than two gunshots, flying over the shores of the lake chosen for night shelter, or (if the lake be a large one, broken up by stretches of reeds into a series of smaller patches of open water) over the edges of such spaces. Uttering all the time its loud double note, the leader hovers over the lake, flies a little aside, again returns, and whirls round several times above each suspicious object. If the fowler lying in wait notices the goose hovering above him, he must not stir on any account. Sometimes the goose will fly off to some other lake in the neighbourhood, and after looking at it will return to complete its inspection. This done, the bird again flies to the field, and, after a certain interval, about a quarter of an hour, when the sun is going down, will return with a companion, when the examination is begun over again. The pair now fly perceptibly lower over the lake, and the loud cry constantly alternates with a low cackle, as if the geese were having a talk. I am inclined to think that the foremost goose is a male and the second a female, as it has always seemed to me that the second bird is smaller than the first, and its voice nothing like so sonorous. This examination concludes by the two birds settling on the middle of the lake, drinking, shaking their wings, and then flying up. The second goose again flies round the shores of the lake, but now much lower, so that a lucky shot may bring it down; while the foremost bird, whirling in wide circles, rises ever higher and higher, its note resounding louder and louder in the evening calm. Finally, from the field whence the foremost goose appeared is heard a confused sound, at first hardly audible but gradually increasing in volume. The geese have started from the field. The sound becomes more and more audible, till it is clear that it is not a continuous rumble but the sum of many hundreds of voices, and the foremost goose sets off to meet the approaching squadrons. The cry rises to an incredible intensity, the rustle of hundreds of wings is heard, like the whistle of a storm sweeping over a forest, and the geese begin to drop on to the lake from every side, at first in the middle and then nearer and nearer to the shores. The cackling, splashing on the water, and flapping of wings produce an indescribable din. Once at such a moment my muzzle-loader misfired, but the sharp crack of the cap did not disturb the geese, as they probably did not hear it. By degrees all quieten down and one hears the reassuring low cackle of the old birds. If the weather is not calm, the geese always swim against the wind and crouch under the reeds or bushes on the windward side of the lake, but I have not noticed whether they land. On the vast Asly-kul, the shores of which for the greater part of their extent are bare and in many places steep, the geese in calm weather pass the night on the middle

of the lake,[1] and only during a high wind swim to shelter under the cliffs. Unfortunately, I was unable to note at Asly-kul whether the old birds made a previous inspection of the lake; but it seemed that this was not the case. In the morning (at break of day) the geese, hungry after their night's rest, rise in separate flocks and fly off again to the field. As I was able to shoot every other day on the same small lake, and the geese at each successive shoot did not seem any more cautious than on the first occasion, I came to the conclusion that the halts of *A. neglectus* in the neighbourhood of Shungak-kul last less than two days.

"The departure of the flocks which have stopped for the day takes place, so far as I was able to judge, after the mid-day drink and after the night's rest on the water; the flock breaking up and flying, not to the field whence it arrived, but farther in the direction of its migration.

"Among the specimens of *A. neglectus* obtained by myself, there is not a single example in first autumn plumage; the moulting of the small feathers in all being not quite complete. First to moult, it would seem, is the under-part of the body, next the head and neck, last of all the scapulars. A specimen of *A. segetum* in my collection from the Ufa district was shot on Shungak-kul from a flock of *A. neglectus* in a lucky right and left which brought down four birds at once.

"I sent one of my bag of *A. neglectus* to the British Museum, and another to the Zoological Museum of the St. Petersburg Academy of Science."

[1] I think this must have been due to some special causes, as geese of other species under normal circumstances do not pass the night on open and deep water.

THE PINK-FOOTED GOOSE

MELANONYX BRACHYRHYNCHUS, BAILLON

Plate 8

English—*Pink-footed Goose*; *Grey Goose*; *Blacknebs* (Scotland); *Pink-footed Bean-Goose* (Cordeaux).
Russian—*Korotkoklyuvy gus*; *korotkoklyuvy* and *korotkonosy gumennik* (book names).
German—*Kurzschnäbelige Gans*; *Rosenfussige Gans*.
French—*Oie à bec court*.
Danish—*De Kleine Rietgans*.
Swedish—*Spetzbergens-Sädgas*.

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Anser segetum, var. *brachyrhynchus*, Bonaparte, Compt.-Rend., xliii. p. 648 (1886).
Anser ferus, Evans and Sturge, Ibis, 1859—(Spitzbergen).
Anser cinereus, Thorell, Philos. Mag. Med. Kand., p. 61 (1859).
Anser segetum, var. *brachyrhynchus*, Malmgren, Oef. K. Vet. Ak. Forh., p. 189 (1863).
Melanonyx brachyrhynchus, Buturlin, Dikie Gusi R. I. ("Psov. i Ruzh. Okh.," 1901); *id.*, separat., p. 26 *et seq.*
? *Anser rufescens*, Palmén (*nec* Brehm), Finl. Fogl., ii. p. 339 (1872) (*neglectus*, Sushkin ?).

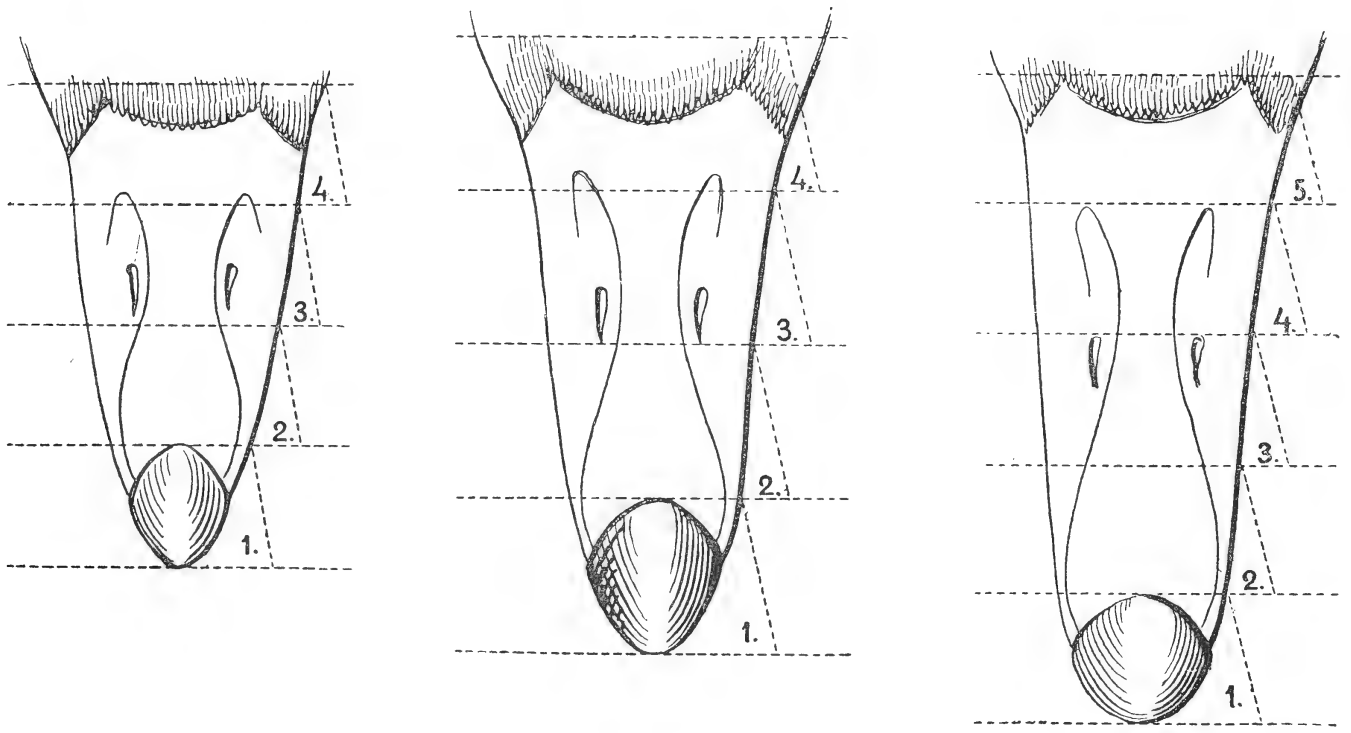
ADULT MALE

Whole head and neck brown with chocolate or coffee tinge, and often with a small number of white plumules at base of bill. Upper part of back, between scapulæ, brown with rufous tinge. Lower part of back and scapulars light brown, the feathers becoming towards

tips rufous and edged with light rufous or light grey. Rump slate-brown; upper and lower tail-coverts pure white. Tail blackish brown, with white edgings and tips to the feathers. Upper wing-coverts slaty ashen grey, and edged (more or less widely) with light rufous.[1] Tips of median and greater wing-coverts very pale grey rufous. Outer primaries grey, with black tips; inner primaries and secondaries uniformly brown-black, latter with narrow whitish margins; tertiaries dark brown with wider whitish edgings. Whole breast rufous brown, with pale edgings to feathers, producing a barred wavy effect. Flanks rufous brown, each feather at tip passing gradually into rufous, and fringed with lighter, sometimes greyish, margins.

Remaining part of under surface of body dingy white, upper part of belly with darker grey transverse striping. Lower wing-coverts and axillaries dark grey. In the colouring of the plumage, and in particular of the upper surface of the wing, this bean-goose thus shows greater resemblance to the grey-lag than to its congeners.

The bill, from its shortness and in having only 20 or at most 22 teeth on each side of the upper mandible,[2] approaches nearer, in shape and proportion of length of nail to total length of culmen, to that of the typical bean-goose (*M. segetum*) than to that of any of the others, as will be clearly seen from the annexed figures of the bills of the bean, yellow-bill, and pink-footed geese.



M. brachyrhynchus, ♂
Culmen 48 mm.
(Spitzbergen.)

M. segetum, ♂
Culmen 58 mm.
(Ural.)

M. arvensis, ♂
Culmen 66 mm.
(Novgorod.)

Colouring of bill black; but between the black nail of the upper mandible and the front edge a rosy flesh-coloured band, embracing both mandibles, from which on upper mandible extends backwards, under nares and along tomium, a wedge-shaped streak of the same colour, sometimes reaching only to posterior margin of nasal apertures, but more rarely right up to the gape. Personally, I have not seen a specimen of the latter type.

[1] In an old Spitzbergen gander these edges are whitish grey, at a distance even seeming white; but this bird was obtained in July, *i.e.* during the fading of the feathering before moulting.

[2] I had long finished this notice, when I received in January 1903 a letter from Mr. Frohawk, in which he enclosed me a drawing of the bill of a goose of this species, obtained by Mr. Pike in Holland, and in which on one side of the upper mandible are 25, and on the other 26 teeth. The bill, says Mr. Frohawk, is, as it were, thinner than in ordinary pink-footed geese. I must own that, judging from Mr. Frohawk's drawing, a doubt arises in my mind whether the goose belongs to this species. Unfortunately, not having seen it, I cannot decide the question.

Very important is the assertion of several eminent English ornithologists that, when breeding in captivity, some of the offspring of this species have yellow (orange) bills and legs, while others of the same brood show the normal rosy flesh-colouring of the wild birds.

At present there are apparently no intergrading forms between such examples. Once it is known that such occur, the question must naturally present itself: Are not pink-footed geese met with in the wild state with yellow (orange) bills and feet? This question, so far as I know, has been answered only by Sir R. Payne-Gallwey,[1] who states that he has killed pink-footed geese with bills and feet of the same orange colour as in the bean-goose.[2] Hence the legs and feet are of the same rosy flesh-colour as the bill. Claws black.

Accordingly, if there really occur in the wild state individuals with orange or yellow bills and feet, then the specific characters of this goose must be sought in the size and form of the bill, the ashy grey colouring of the wing-coverts, and the general dimensions of the whole bird, which are considerably less than those of all the other representatives of the group *Melanonyx*.

Dimensions of Adult Gander

Total length	650–708 mm. (= 25.5–27.8 in.).
Wing about	400 mm. (= 15.7 in.).
Culmen	44–48 mm. (= 1.73–1.88 in.).
Greatest visible depth of lower mandible laterally with shut bill	5.7 mm. (= 0.22 in.).
Tarsus	56 mm. (= 2.20 in.).

Number of teeth on each side of upper mandible, 20–22 (and, doubtful, 26).
Weight from $6\frac{1}{2}$ to $7\frac{1}{4}$ English lbs.

I do not think that these dimensions include the extremes, but I had too few skins to judge.

Adult Female

On the whole, only less in size than the male. In winter (Degland and Gerbe) neck and upper part of body somewhat lighter, and bill always shorter than in male. From the fact that all geese are subject to considerable variations in the colouring of the plumage, I merely note the above statement by Messrs. Degland and Gerbe, not regarding such lighter winter colouring as a constant feature. In spring, again, according to the same authors, the edgings of the feathers in this goose become rufous, and the head acquires a bluish tint; but I have excellent grounds for believing that such variations in the colouring have no connection with the season of the year, but are purely individual, perhaps dependent on food.

Younger Birds

These differ from fully mature specimens mainly in the duller colouring of the plumage and in the upper part of the body being browner than in the latter, while the wing-coverts are far browner and not ashy grey. Bill almost black (in birds in first plumage), with a very small amount of rose-red colouring on apical part. Feet, apparently, in first

[1] *Letters to Young Shooters*, 3rd Series, p. 69 (1896).

[2] A doubt involuntarily arises, whether this distinguished sportsman did not take small specimens of the bean-goose for large specimens of the pink-footed goose.

plumage, dull greyish red. It is, however, desirable to have a more accurate picture of all the dresses of this goose than those possessed by the authors who have written on it and have seen it alive.

Young in Down

As regards the colouring of the young in down, we have two rather contradictory descriptions.

Thus, according to Professor A. Newton, specimens from Spitzbergen "are clothed in greenish yellow down, with patches of olive on the back of the head, lore, and region of the eye, upper side of the wings, middle and lower part of the back, and the flanks; but the ground-colour of one is much darker than the other. One (the darkest) specimen, singularly enough, has on the outer edge of the middle toe, and on the outer interdigital web of each foot, some two or three small yellowish feathers—a fact I cannot at all explain."

According, however, to Mr. Trevor-Battye, who became acquainted with this goose in Spitzbergen, the young have no yellow but are covered with grey down.

As to the alleged occurrence of this goose in Russia, a doubt has been expressed, and at the same time amply supported, by Mr. Buturlin in his interesting work *Dikie gusi Rossiiskoi Imperii*, wherein it is suggested that the statements of Mr. F. D. Pleske and Mr. N. N. Somov are insufficient to indicate that these authors had really to do with this species, the colouring of the soft-parts of which are of the same rose flesh-colour as in the pink-foot.

I go further, in my bibliography, and attach queries to a whole series of notices supposed to refer to this goose. Not that I have any desire to deny the possibility of the pink-footed goose visiting the more western part of Russia; on the contrary, I fully admit such possibility, but until one case of such straying has been substantiated, I decline to receive this species into the Russian fauna.

Since Dr. Sushkin discovered and described a goose with rosy bill and feet from the Ufa Government, which occurred on passage in Hungary, wintering in Persia and nesting in Novaia Zemlia,[1] there can hardly be any doubt that all the notices of a pink-footed goose being met with in European Russia refer either to *M. neglectus* or to the Novaia Zemlia bean-goose described by Heuglin, and later on by Mr. Buturlin, as *M. carneirostris*, if only this goose prove to be really a distinct species, and not some hybrid, for example, of the yellow-bill or bean-goose with Sushkin's goose, which, of course, is perfectly possible from the statements given in the notice of that Novaia Zemlia bean-goose.

Mr. N. N. Somov's statement that, judging from a communication by Mr. Chebyshev,[2] from the district in question, geese killed in the Starobelsk district of the Kharkov Government "with light-rose bills and feet and mottled belly" probably belong to the species *brachyrhynchus*, is untrustworthy, since the weight given for them (8 to 10 lbs.) absolutely refutes the assertion, to say nothing of the mottled belly—an undoubted character of a goose of the genus *Anser*. Light-rose bill and feet to match, mottled belly, and weight 8 to 10 lbs., to my mind, speak perfectly definitely in favour of the common grey-lag (*Anser anser*).

[1] And in all probability on Kolguev, as we shall see later on.

[2] *Okhotnichya Gazeta* for 1889, No. 11, p. 133.

An examination of the other instances cited with a query has convinced me that not one of them will bear criticism, and therefore I confidently affirm that hitherto there is no record of an authentic case of the occurrence in Russia of the pink-footed goose. Here I cannot refrain from mentioning a communication from Odessa inserted some years ago in the *Field*, wherein a certain English sportsman stated that he saw somewhere near Odessa many of these geese (pink-footed geese), although he did not get the chance of killing one.

When I considered it necessary to give a detailed description and figure of this species in my *Gusi Rossii*, I did so in order to give a true idea of the species and to avoid in the future such doubtful identifications. If such slender knowledge of this goose on the part of Russian sportsmen and ornithologists may find some excuse in the comparatively scanty material available, no excuse for their ignorance can be offered by ornithologists living in a country where this goose is one of the most numerous species in winter.

As an instance of my meaning, the late Mr. Seebohm fell into an error when he wrote in his *British Birds*[1] that this goose can hardly be regarded otherwise than a local race or island form of the bean-goose (*Anser segetum*)![2] Equally astonishing is the opinion expressed by Mr. John Cordeaux in his *British Birds, their Nests and Eggs*, that this goose does not even deserve to be regarded as a sub-species of the bean-goose.

Most remarkable, however, is the fact that these two ornithologists should decide a question of so much importance, when they were entirely unaware that, under the name of bean-goose, they were confounding two perfectly distinct species of geese — the harvest or common bean and the yellow-bill; and this because neither the one nor the other took the trouble to enter more deeply into this question, which would have been easy enough, after Naumann had discussed it so carefully.

Geographical Distribution

It appears certain that this goose nests on Spitzbergen, and there is hardly a doubt that it is found also in Franz Josef Land and very probably in Iceland, where, according to the testimony of Mr. Proctor,[3] it has been procured once or twice, the example being in one case a female with an egg she is supposed to have laid. In Greenland the pink-footed goose has not hitherto been found, neither has it been authentically regarded as breeding anywhere on the European continent.

The species occurs on passage and winters every year in North-western Europe. While in Scandinavia, North Germany, Holland, Belgium, and France it is merely a casual and rare visitor, it winters regularly every year in large numbers in Great Britain, where at the present day it is the common species among the bean-geese. It is very probable that it sometimes also strays into the interior of the continent of Western Europe, and descends along the Atlantic seaboard, although seldom, to Spain and Portugal; but all such records demand careful verification. That the geese with rosy bills and feet now and then met with in India in winter, belong not to this species but to Sushkin's goose (*M. neglectus*) is, to my mind, an indisputable fact, since I was convinced by Mr. N. A. Zarudny that it was the latter that was found wintering in Persia, a skin from which country I have carefully examined.

[1] John Cordeaux in *British Birds, their Nests and Eggs*, erroneously cites Seebohm as stating that this is an *inland* form, instead of *island* form, as stated by the latter.

[2] Vol. iii. p. 498.

[3] *Ibis*, 1864, p. 132.

No serious importance, it seems to me, should be attached to the statement of the occurrence of this species in Japan. Of course, I should be more certain on these points had I specimens from India and Japan for determination, but in view of the impossibility of this, I am driven to be content for the present with mere inferences.

In regard to Spitzbergen, Mr. Trevor-Battye writes as follows: "The pink-footed goose is distributed thinly, but generally, over a great part, at any rate, of Spitzbergen. Its breeding habits do not differ, so far as my observation goes, from those of *A. erythropus* or *A. segetum*. Like these birds, it seldom, on the mainland, nests by the sea, but retires inland, and chooses for its nest some elevated point overlooking a stream or lake. Occasionally it nests upon small islands, and a female bird, with its nest, eggs, and the surrounding turf, now in the National Collection, was obtained by me on a small island off Cape Boheman on Ice-Fjord on June 26, the three eggs being slightly incubated. This was the only pair of geese upon this island. I shot the female as she flew off the nest, and the male for some time displayed great solicitude, swimming round and round and calling incessantly, but never came within shot. . . . On July 24 two broods of young were running with their parents, near the Splendid Glacier. Both these broods were in an advanced state of *grey*—not yellow—down. . . . I have elsewhere described the way in which a bean-goose will run along and then squat with the neck stretched out along the ground exactly in the attitude assumed by the thick-knee or Norfolk plover. The pink-footed geese of Spitzbergen behave in the same way if they have their young with them."

Mr. Trevor-Battye further adds that the nest is well guarded by the gander, which at times quits its guard-post and begins to walk round and round the sitting goose, along a path it has laid down, and meets an unbidden approach with a prolonged series of short, high notes, resembling those of the brent (*Branta bernicla*).

As to the eggs, according to the evidence of various authors, these have a rather smooth shell with a slight gloss. In form they present fairly regular ovals, with one end somewhat sharper than the other. In colour they are yellowish white, and their dimensions vary in length from 3.10 to 3.40 in. (= 78.7–86.3 mm.), with a diameter of 2.15 in. (= 54.8 mm.).

These measurements are slightly exceeded by five eggs brought from Spitzbergen by the Russian expedition, and now preserved in the Zoological Museum of the St. Petersburg Academy of Science, as appears from the following table, drawn up by Mr. G. F. Göbel:—

Max. breadth 52.5 mm. (= 2.06 in.) with 80 mm. length (= 3.14 in.).
Max. breadth 52.5 mm. (= 2.06 in.) with 76 mm. length (= 2.99 in.).
Min. breadth 50 mm. (= 1.96 in.) with 84 mm. length (= 3.30 in.).
Max. length 84.5 mm. (= 3.32 in.) with 50 mm. breadth (= 1.96 in.).
Min. length 76 mm. (= 2.99 in.) with 52.5 mm. breadth (= 2.06 in.).
Weight 1050 cgrm. with 51.5 mm. breadth (= 2.06 in.) and 83.5 mm. length (= 3.28 in.).

Five specimens, mean breadth 51.5 mm. (= 2.02 in.); max. breadth 52.5 mm. (= 2.06 in.); min. breadth 50 mm. (= 1.96 in.).
Five specimens, mean length 80.9 mm. (= 3.18 in.); max. length 84.5 mm. (= 3.32 in.); min. length 76 mm. (= 2.99 in.).

The note of this goose is described as similar to that of the other bean-geese, but harsher and more piercing. In manner of life and habits this species also apparently

resembles the other bean-geese, and is fond of keeping with them and white-fronted geese. For example, Sir R. Payne-Gallwey met the three species together, and even shot them in company. The same author writes: "It is a common bird during autumn and winter in parts of Great Britain, notably in the south-east of Scotland, in the Wolds of Yorkshire, in Lincolnshire, near the coast of Norfolk, and in several other localities, excepting the south of England. On the banks of the Severn and along the shores of the Bristol Channel I have seen large numbers of these birds. In Ireland I have never shot or heard of the pink-footed goose, and it has not been recorded therefrom."

This goose, apparently, stands captivity well, and breeds freely under favourable circumstances.

THE YELLOW-BILLED BEAN-GOOSE

Melanonyx arvensis, Brehm

Plate 9

English—*Bean-Goose*; *Bog-Goose*; *Grey Goose* (these names being used for both *M. arvensis* and *M. segetum*); *Yellow-billed Bean-Goose* (F. W. Frohawk); ? *Carr-lag* (F. Coburn, if = *paludosus*, Strickland).

Russian—*Gus polevoi*; *gumennik polevoi*; *sery gus*; *laplandski gumennik* (Buturlin); *kustarny gus* (Yaroslavl gov., *teste* Sabaneev, if it does not refer to the bean-goose); *pashenny gus* (from confounding with *M. segetum*); *khrushkói* (Perm. gov., if not *M. segetum*); *khrushkáya kazarka* (Perm. gov., *teste* Sabaneev); *gus* and *diki gus* (Pomory, probably this species).

Lappish—*Chon* (on Imandra); *Chuónya* (East Finmark); *Stuóra chuónya* (Munioniska).

Finnish—*Hanhi* (gen. name of goose); *Metsä-hanhi* (wood-goose); *Isohanhi* (great goose); *Komahanhi.*

German—*Acker-Gans*; *Feldgans*; *Feldsaatgans*; *grosse Gans*; *Buntschnäbliche Saatgans*; *grosse Moorgans*; *grosse Zuggans*; *Buntschnabel*; *Rostgelbgraue Gans.*

French—*Oie sauvage*; *oie des moissons*; *oie vulgaire* (ces noms étant donnés aussi à *M. segetum*).

Anas fabalis (*partim*), Latham, Gen. Syn., Suppl. i. p. 297 (1787).

Anas segetum, Gmelin (*partim*), Syst. Nat., i. p. 512 (1788).

Anser arvensis, Brehm, Isis, 1830, s. 996; *id.*, Vög. Deutschl., s. 839 (1831); Naumann, Vögel Deutschl., xi. p. 277, pl. 286 (1842); Fritsch, Vög. Eur., p. 407, pl. 45, fig. 4 (1870); Pleske, Th., Beitr. Kennt. Russ. R., 2nd ed., ix. p. 233 (1886); Pleske, Kr. obz. mlek. i pt. Kolsk pol., p. 337 (1887); Middend., Reis. Sib., ii., pp. 226 and 227 (*partim*), 1851; Büchner, Pt. Spb. gub., p. 513 (1884); Büchner and Pleske, Beitr. z. Orn. S. P. G., No. 176 (1881); Eversmann, Or. kr., p. 554 (*partim*?), 1868; Bogdanov, Pt. i zv. Povolzhya, p. 147 (1871); Sabaneev, "Zhurn. Okh.," 1874, p. 12; Menzbier, Pt. Ross., i. pp. 745 and 746 (1895); Buturlin, Dikie gusi Ross. Imp. ("Psov. i Ruzh. Okh.," 1901, Feb.-April); *id.*, separ., pp. 34 and 46 (sub-g. *Melanonyx*); Somov, Orn. F. Khark. g., p. 444 (1897); Kholodk. i Silant., Pt. Yevr., 1901, p. 522, pl. 42, f. 3; Zarudny, Orn. F. Zakasp. kr., 1896, p. 437; Ruzski, Mater. iz. pt. Kaz. gub., p. 117; Lorenz, Vögel Mosk. Gouv., p. 58 (1894); Radde, Ornis Cauc., p. 445 (*partim*), 1884; Palmén, Cab. J. f. Orn., 1876, p. 53; Frohawk, "The Field," Oct. 4, 1902, p. 605 (with drawings of bill); Ruzski, Tr. Obshch. Yest. pri Kaz. Un., xxv. No. 6, p. 117 (1893); Frohawk, "Zoologist," 1903, p. 41, pl. ii.; Sorokin, "Psov. i Ruzh. Okh.," Jan. 1903, p. 113, etc.

Anser sylvestris, Degl. and Gerbe, Orn. Eur., ii. p. 294 (1849) (*partim*); *id.*, op. cit. ii. p. 481 (1867) (*partim*).

Anser segetum, Bruch, Isis, 1828, p. 734, pl. ix. fig. 4; Khomyakov, Pt. Ryaz. g. (Mater. k pozn. Faun. i Fl. Ross. Imp., otd. zoolog., No. 1 (1900), pl. ii. figs. 1, 2; *id.*, separ., p. 34, pl. ii. figs. 1, 2; ? Nikolski (*partim*?), Pozv. zh. Kryma, p. 289 (1891); Radde, Ornis Cauc., p. 445 (*partim*), 1884; Sabaneev, Ukaz. Kn. St. Okh. i Zool. Sod., pp. 455-458 (1883); Zarudny (*partim*?), Orn. F. Orenb. kr., p. 223 (1888); Ruzski, Ptitsy Kazanskoi gub.; Midd., Reis. Sib., ii., pp. 225-227 (*partim*), 1851; Sushkin

(*partim*), "Ibis," 1897, pp. 5-6; Brauner, Kratk. Opred. dichi stepn. pol. Rossii, pt. i., Ptitsy, p. 99 (1897); Coburn, "Zoologist," 1902, p. 441 *pro parte*, pl. iii.

Anser middendorffii, Severtsov, Vert. Gor. raspr. Turk. Zh., pp. 70 and 149; *id.*, Cab. J. f. Orn., 1874, p. 435.

Anser segetum middendorffii, Khomyakov, Pt. Ryaz. gub., pp. 34 and 35, pl. ii. fig. 2 (*nec* fig. 3).

Anser segetum, var. *serrirostris* (Swinhoe), Pleske, Rev. Turkest. Orn., Mém. Ac. Sc. St. Petersburg, xxxvi. No. 3, p. 54.

Anser middendorffii, Severtsov, Cab. J. f. Orn., 1875, p. 184; Buturlin (*partim* respectu Turkestani), Dikie Gusi Ros. Im. ("Psov. i Ruzh. Okh.," 1901); *id.*, separ., p. 31.

Anser segetum, var. *arvensis*, Buturlin, Tabl. opred. plastinchatokl. ("Psov. i Ruzh. Okh.," 1900); *id.*, separ., p. 8.

Anser segetum arvensis, Buturlin, Sinopt. tabl. Okhotn. Pt., p. 44 (1901).

Anser fabalis, Salvadori, Cat. Birds Brit. Mus., xxvii. p. 99 (1895), *partim* (*cum A. segetum*); Oates, Man. Game Birds of India, ii. p. 74 (1899).

Anser serrirostris, var. *middendorffii*, Salvadori, Cat. Birds Brit. Mus., xxvii. p. 102 (*partim*; resp. Turk.), 1895.

Anser leuconyx, Selys-Longchamps, Naumannia, 1856, p. 398.

? *Anser paludosus*, Strickland, Rep. Brit. Assoc., 1858, pp. 131, 132; Coburn, "Zoologist," 1902, p. 441, pl. iii.

Note.—I am compelled to omit the rest of the Russian sporting literature which may concern this species, as I was obliged to do in the case of *M. segetum*, being absolutely unable to make anything out of it, that is to say, to which of these two species authors' statements refer. I shall discuss this question at greater detail in the paragraph on the geographical distribution of the present species.

Adult Male

Head and neck grey-brown with faint reddish, sometimes rusty or yellowish buff, tint. Along whole of base of upper mandible more or less developed white feathering, in very young birds and, more seldom, in very old individuals absent. Occasionally this white feathering attains on forehead a breadth of 15 mm. (= 0.59 in.). White feathering around base often interrupted by naked angles of bill, projecting into forehead laterally, but variations in its breadth noticeable in different individuals, independently of sex and age.

Forehead, occiput, and nape somewhat darker than remaining parts of head; often, but not always, a dark band stretches back in continuation of gape. Chin and throat almost always coloured somewhat lighter than cheeks, and descending, this colouring, gradually becoming lighter, passes on upper breast into yellowish white with grey spots of indeterminate shape. Lower part of breast and belly greyish white. Flanks dark brown, with whitish brown edgings to feathers, which as they approach wing become lighter, and pass finally, at the wing itself, into almost pure white. Thighs light grey. Lower part of neck behind and mantle grey-brown, with lighter greyish margins to feathers; back and scapulars dark brown, edgings to feathers at first greyish brown and at tips whitish, forming a regular transverse light (whitish) wavy pattern on dark ground. Similar light wavy but less marked undulations occur in 4 to 6 bars on wing-coverts, which, with exception of a smaller dark ashy grey area lying nearer edge of wing, are of same colour as scapulars. Rump brown-black; tail-coverts, both upper and lower, and sides of crissum and whole of vent, white.

Tail-feathers 18 in number, very rarely 20, brownish grey-black with broad white tips; median, with narrow whitish margins; on next tail-feathers (outwards) these margins continually increase in breadth; under-side of tail-feathers white with greyish mottlings, centre grey with minute white speckles.

Wing above brown, more greyish on bend, alulæ, and primary wing-coverts. Primaries brown and greyish only basally, remaining flight-feathers dark brown. Under wing-coverts and axillaries dark grey or soot colour, but glossy, smaller wing-coverts being here lighter.

Adult Female

On the whole somewhat inferior to male in size and weight, and colouring of soft-parts somewhat paler than in the latter. I could discern no difference in the plumage.

Young Birds (Second and Third Year)

General colouring darker than in adults, with duller rufous brown edgings to feathers and more marked rufous tinge on neck. Bill with very limited extent of yellow-orange colouring, concentrated between nail of upper mandible and anterior edge of nasal depression. Here yellow (or yellow-orange) encircles both mandibles, as seen in adult bean-geese (*M. segetum*). From this feature such young birds have been taken for examples of the latter species.

In all birds of this age I have examined, from the above-mentioned light ring on the upper mandible there extends posteriorly, under the nares, to a greater or less distance, a wedge-shaped projection or space, which sometimes stretches along the edge itself of the bill.

Inner surface of upper mandible almost entirely black. Legs and feet yellow with blackish or dingy grey webs, and blackish claws.

Young Birds in First Plumage

Still less yellow on bill, head and neck more rufous, and feet dingy yellow. Feathers of under surface of body far narrower than in individuals already moulted. White plumules scarcely ever occur at base of bill.

Of the young in down I have no knowledge.

Dimensions of Adult Birds of Both Sexes

Total length, 730–900 mm. (= 28.70–35.40 in.), and only in biggest Turkestan example 905 mm. (= 35.60 in.).
Expanse, up to 1620 mm. (= 64 in.), usually somewhat less.
Wing, 410–490 mm. (= 16.10–19.20 in.), rarely 500 mm. (= 19.60 in.).
Culmen, ♀ 65 to 67 mm. (= 2.16–2.63 in.), ♂ 56 to 71.5 mm. (= 2.20–2.81 in.), and only in one case known to me 72 mm. (= 2.83 in.)—in the Turkestan ♂ of Severtsov's collection.
Greatest depth of lower mandible, seen from without, with shut bill, 7 to 8½ mm. (= 0.27–0.33 in.).
Breadth of bill opposite middle of nasal apertures, 20–22½ mm. (= 0.78–0.88 in.).
Depth of bill (of both mandibles), opposite middle of nasal apertures, 24–26 mm. (= 0.94–1.02 in.).
Depth of bill at base of both mandibles, 30–33 mm. (= 1.18–1.29 in.), and in one case only, 34 mm. (= 1.33 in.)—in the largest Turkestan specimen of Severtsov's collection.
Tarsus, about 66–73 mm. (= 2.59–2.87 in.).
Number of teeth on each side of upper mandible, 24–28, and only in one known case 23, but unfortunately I have not myself verified this.
Weight, from 7½ to 11 Russian lbs.

Note.—Length of middle digit without claw almost equal to length of tarsus, but in dry specimens this is not easy to measure. I have also convinced myself that no constant relation exists between the tarsi and the length of the middle toes in any geese, and that individual variations in this respect are very considerable.

Considering that two or three points are quite sufficient to distinguish the present goose from its East Siberian representative (*M. arvensis sibiricus*), I give a table of the measurements of a few examples of those I have examined, with the localities where they were obtained.

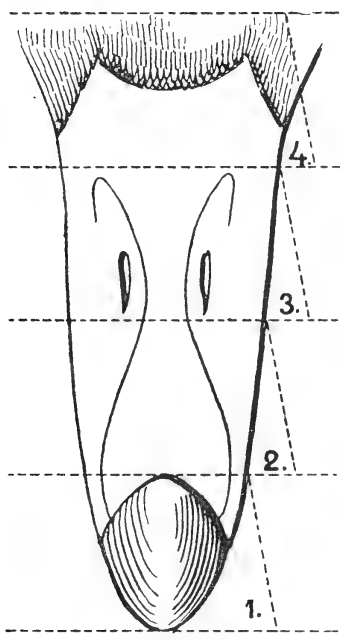
Sex.	Culmen.	Depth of lower mandible, seen from without, with bill shut.	Number of teeth on each side of upper mandible.	
	mm. in.	mm. in.		
♀	59½ = 2.34	7 = 0.27	24	Moscow, Prof. M. A. Menzbier's coll.
♀	59 = 2.32	7 = 0.27	26	Ryazan, collected by Khomyakov, who took some of the specimens for *M. middendorffii*, Sev.
♀	66 = 2.59	7½ = 0.29	25	
♀	55 = 2.16	7 = 0.27	24	
♀	65 = 2.55	8 = 0.31	25	
♂	54 = 2.12	7 = 0.27	25	
♂	70 = 2.75	7 = 0.27	28	
♂	67 = 2.63	8 = 0.31	25	
♂	64 = 2.51	?	?	
♂	65 = 2.55	?	?	Chinaz, Severtsov's coll., Zool. Mus. Ac. Sci., St. Petersburg.
? ♂	68 = 2.67	?	24	Fergan district, Severtsov's coll., Zool. Mus. Ac. Sci., St. Petersburg.
♂	62 = 2.44	?	?	Thian-Shan (West), Severtsov's coll., Zool. Mus. Ac. Sci., St. Petersburg.
? ♀	62 = 2.44	?	?	Chimkent, ,, ,,
♂	62 = 2.44	7 = 0.27	?	,, ,, ,,
♂	67 = 2.63	8½ = 0.33	?	,, ,, ,,
♂	61 = 2.40	?	?	Chinaz, ,, ,,
♂	64 = 2.51	?	?	Fergan district, ,, ,,
♀	?	7 = 0.27	?	,, ,, ,,
♂	72 = 2.83	8½ = 0.33	26	Chimkent, Severtsov's coll., Zool. Mus. Ac. Sci., St. Petersburg—biggest example of Severtsov's coll., and probably original of his *M. middendorffii.*
? ♂	70 = 2.75	?	24	Chimkent, Severtsov's coll., Zool. Mus. Ac. Sci., St. Petersburg.
♂	66 = 2.59	?	?	Kharkov government, N. N. Somov's coll., Zool. Mus. Ac. Sci., St. Petersburg.
♂	63 = 2.48	?	?	,, ,, ,,
♂	66 = 2.59	7 = 0.27	26	Petersburg gov., from A. P. Semenov (my coll.).
♂	65 = 2.55	8 = 0.31	25	Belgium (my own coll.).
♂ juv.	57 = 2.24	6 = 0.23	24	Obdorsk, K. M. Deryugin, coll. Zool. Mus. Ac. Sci., St. Petersburg.
♂ ad.	67 = 2.63	7 = 0.27	28	Zvenigorodsk district (Mosc. gov.), Lorenz, Zool. Mus. Ac. Sci., St. Petersburg.
?	62 = 2.44	7 = 0.27	25	Tomsk, May 15, 1902, from Prof. Kashchenko; much yellow on bill.
?	58 = 2.28	7½ = 0.29	25	,, ,, ,, ,,
?	65 = 2.55	8 = 0.31	26	,, ,, ,, ,,
juv. ?	60 = 2.36	7 = 0.27	25	,, ,, ,, ,,
ad. ?	70 = 2.75	8½ = 0.33	28	,, ,, (bill passing to *sibiricus* type; no white feathers basally).
?	67 = 2.63	8½ = 0.33	28	,, ,, (*arvensis* type).
?	67 = 2.63	8½ = 0.33	26	,, ,, many yellow spots all over bill.
juv. ?	60 = 2.36	8 = 0.31	27	,, ,, typical youngster.
juv. ?	59½ = 2.34	7 = 0.27	25	,, ,, ,,
?	71½ = 2.81	Lower mandible wanting	26	Of 11 birds of this species, brought in 1902 by S. A. Buturlin from Novaia Zemlia (Malyya Karmakuly), in all yellow colour on bill prevails over black.
	68 = 2.67		27	
	66 = 2.59		26	
	62 = 2.44		27	

If we compare this table with the one in the notice of *M. arvensis sibiricus*, we shall see that there is no possibility of identifying either the Ryazan or the Turkestan *M. arvensis* with the East Siberian *M. arvensis sibiricus.*

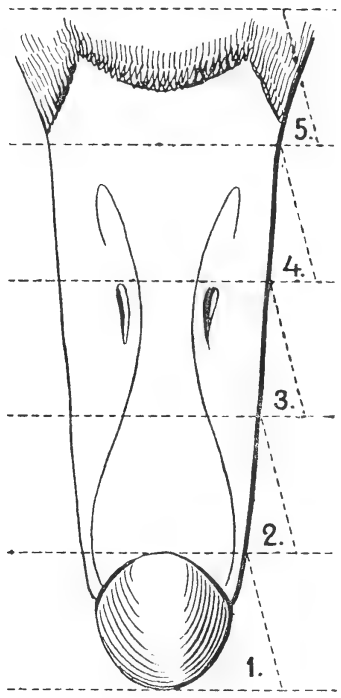
I must, however, now point out, in regard to the bill, the chief distinctions existing between these two geese. To begin with, I have to dwell in some detail on the description of the bill of *M. arvensis*, which affords characteristics sufficient to discriminate with absolute certainty between this species and the bean-goose (*M. segetum*). Before doing so, I ask the reader to note that in this description I have exclusively in view the bills of adult birds. The bill of the yellow-billed goose is considerably more elongated than in *M. segetum*, from which it also differs in form. It is also longer and comparatively broader at the point, and far more depressed behind the nail of the upper mandible. At the same time the lower mandible in *M. arvensis* is less curved and comparatively less deep in the thickest part (looking at the shut bill from the side) than in *M. segetum.* The nail is considerably

shorter, but at the same time also broader and more rounded both longitudinally and transversely. This difference in the form of the bill and nail is clearly shown in Plate 23 of the present work. In addition, I give figures of the bills, taken from above, of both *M. arvensis* and *M. segetum*, by comparison of which the essential difference in the size of the upper nail will be very apparent.

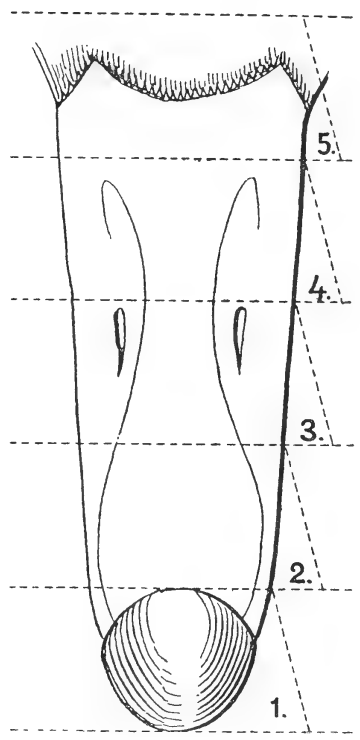
We may first of all notice that, as shown by the dotted lines across these figures, in *M. arvensis* the length of the nail is included in the total length of the bill usually considerably more than 4 times, or, far less frequently, 4 times, while in *M. segetum* the nail is included in the total length of the bill considerably less than 4 times, or not more than $3\frac{1}{2}$ times, so far as I can judge from the examples of the latter species I have had in my hands.



M. segetum, ♂
Culmen $60\frac{1}{2}$ mm.
(Northern Russia.)



M. arvensis, ♂
Culmen 66 mm.
(St. Petersburg.)



M. arvensis, ♀
Culmen 70 mm.
(Ryazan.)

These differences in the structure and form of the bills of the yellow-billed and the bean- goose were long since clearly and intelligibly described, as well as figured (although the figures were, in my opinion, inaccurate), by Mr. Naumann,[1] but unfortunately attracted scant attention among ornithologists, who concluded that as a guide to the discrimination of these two species it sufficed to confine themselves to the distribution of the black and orange areas on the bills, in consequence of which, as we shall see farther on, they could not avoid coming to the erroneous deduction (not having understood the gist of what Naumann had told them) that these two geese constitute but one species with a bill very unstable both in shape and colouring.

To return to the bill of *M. arvensis*, we find behind the nail, towards the nares, that it is very flat above, but farther towards the base becomes gradually stouter, and is fairly high and wide at the forehead. The feathering of the forehead extends on to the base of the bill in a fairly regular flat arch. The feathering at the sides of the upper mandible also projects into this in regular semicircles, whence it results that the naked angles of the bill, projecting into the feathering at the sides of the forehead, are considerably farther removed from the tip of the nail than is the extreme point of the feathering in the upper angle of the gape.

[1] *Naumannia*, 1853, taf. 7.

The nasal depressions in the yellow-billed goose are in the form of a very elongated oval. The oblong nasal aperture lies in the foremost end of the nasal depression, reaching with its anterior edge almost to the middle of the bill.[1] The nares are pervious, but only in their rounded posterior portion. The greatest depth of the part of the lower mandible visible laterally with shut bill very seldom exceeds 8 mm. (= 1.31 in.), and only in one Turkestan example with culmen 72 mm. (= 2.83 in.) does it attain 8½ mm. (= 0.33 in.).

The number of teeth on each side of the upper mandible varies usually between 25 and 28, but in rarer cases there are 24, and from information I have received in one individual there were only 23.

At first I attached great importance to the number of teeth for the determination of species, but have now been obliged to change my view on this character, as specimens received in 1902 by Mr. Buturlin from Novaia Zemlia and Kolguev, as also others kindly examined for me by Mr. Frohawk, clearly showed that the number of teeth is not always a trustworthy character. Indeed, in the majority of specimens of *M. segetum* examined by myself there were only 20 to 21 teeth, but I have now in my hands bean-geese from Kolguev with 24 and 25 teeth. It seems therefore that, in some geese, the number of teeth slightly increases with age, or, more exactly, certain teeth in younger birds are very feebly developed, and only with maturity attain their full size and become conspicuous.

Injuries to the bill are far from rare in geese, and probably mostly occur in early youth. As a rule, on finding in skins that the bill has been injured, one may confidently conclude that the number of teeth will be abnormal.

In *M. arvensis* (as in other representatives of the genus) along the edges of the lower mandible are 9 or 10 more teeth than in the upper, so that if, for example, there are 26 teeth on each side of the upper mandible, one may almost certainly say that in the lower there will be from 35 to 36. The comparative depth of the lower mandible greatly simplifies the distinction of the yellow-bill from the bean-goose at any age, and that, too, alike in fresh-shot individuals or dry skins.

Turning to the colouring of the bill and noting the most essential points relating to *M. arvensis*, we find that in perfectly adult birds of both sexes the bill is almost wholly yellow-orange; and only occasionally is this colouring replaced in the basal half of the bill by a light rosy flesh-tint, which can be seen only in fresh-killed birds. In dry skins all the light parts of the bill are wholly yellow, orange, or reddish orange.

The nails of both mandibles, as in all the representatives of the genus *Melanonyx*, are wholly black and glossy, and the teeth for the most part of a dark colour, and not whitish, as in the species of the genus *Anser*. Again, the black colouring on the culmen itself, between the nares, extending anteriorly approximately to the line uniting the fore-edges of the nares, rarely reaches farther towards the apex. This black colouring on the culmen sometimes reaches to the feathering of the forehead, but more often falls short by a few millimetres. Ordinarily there is a black stripe on the sides of the base of the upper mandible, either in contact with the feathering of the head or slightly removed from and parallel to the same.

In very old birds, in which the white feathering at the base of the upper mandible is already absent, sometimes the whole upper mandible, with the exception of the black nail

[1] I note here by the way that in Khomyakov's representation of the bills of geese in his *Ptitsy Ryazanskoi gub.*, pl. ii. ff. 1 and 3, the nasal apertures are brought too near to the apex of the bill, which is not the case in the originals, as I convinced myself when examining them.

and a patch on the culmen, is entirely yellow-orange, only the rami of the lower mandible being more or less black, as is also the nail. Sometimes, however, the black stretches along the basal half of the edge of the upper mandible, and sometimes black patches of indefinite shape are scattered here and there over the yellow-orange ground of the bill. The basal half (or somewhat more) of the rami of the lower mandible is also at times black, but between this black and the nail the lower mandible is invariably yellow-orange, this latter colour intersecting also the apical part of the naked skin of the chin. In proportion as the length of the bill increases, so far as I have been able to ascertain from the material at my disposal, the black more and more dislodges the yellow from the base of the bill; and once the bill attains a culmen-length of 70 mm. (=2.75 in.), it is safe to say that the whole base will be entirely black; thus to a certain extent indicating the transition to the East Siberian *M. arvensis sibiricus*. This, in its general features, is the arrangement of the yellow-orange and black colouring on the bill of *M. arvensis*.

I may now direct the special attention of the reader to the fact that in young birds of typical *M. arvensis* the yellow-orange colouring never has such a great extension as in old birds, and that often in birds of the second and third years (according to my estimate) the greater part of the bill is wholly black; so that only a broad ring in the apical part of the bill and a wedge-shaped space passing from it backwards under the nares resemble the pattern on the bill of the bean-goose. It is, then, such immature specimens of the yellow-billed goose that have evidently been taken by various authors for *M. segetum*, thus giving rise to that confusion in the literature it is so difficult or even impossible to put right.

It must also be borne in mind that in some individuals the yellow-orange colour is scattered over the black ground of the basal portion of the bill in irregular sharply defined patches. Such examples I hold to be transitional to the fully adult, and they should eventually assume the colouring of typical specimens, which I have described above, and have figured in Plate 23 of the present work.

After death the orange colour often takes a deep red tinge, which must be ascribed to subcutaneous extravasation or infiltration of blood. In living birds, however, the depth of the yellow or yellow-orange colouring is, apparently, subject to considerable variation, directly dependent, I think, on the quality of the food taken by the bird, and its condition, as I have also stated in the notice of the genus *Anser*.

The bare parts of the eyelids in this species are reddish grey; the legs yellow-orange, with lighter webs in full adults and greyish dull yellow webs in young birds; claws black, but occasionally also whitish. It was evidently examples of the latter type which were described by Baron Sélys de Longchamps [1] as *M. arvensis*, var. *leuconyx*; but the author himself afterwards acknowledged this form to be merely an accidental aberration from the type. Occasionally it happens that only the outer toe has a whitish claw, while the rest are black.

The iris is dark brown.

Geographical Distribution

In spite of the confusion between this goose and the bean-goose, we are somewhat better acquainted with its range than with that of the latter. The present species is evidently, on the whole, far more numerous than the bean-goose, and the region of its nidification is larger both in longitude and latitude. This goose breeds from 64° N. lat. upwards in the Scandinavian peninsula and in that of Kola, as well as in the greater part

[1] *Naumannia*, 1856, s. 394.

of Archangel and the Olonets Government, and in particular in the northern portion of Lake Onega, although it is still impossible to indicate its range there in detail. It nests on Kolguev and in Novaia Zemlia, and probably throughout the Pechora district; in Finland its breeding-grounds descend to 62° N. lat. It is the only goose of the *Melanonyx* group which I have observed during five years in its autumn passage on the lakes of the southern part of the Vyborg Government, where I have never noticed the bean-goose. In small separate parties, or even pairs, it breeds in certain localities on the Baltic coast; it doubtless occurs in suitable spots of the Northern Transural, still so little explored; and it certainly nests on the lower waters of the Obi, and in the Taimyr district.[1]

From this it follows that, alike in the West and in the East the breeding range of this species considerably exceeds that of the bean-goose. From the Taimyr peninsula, through the Tomsk Government and the Western Thian-Shan, it descends to winter in Russian Turkestan, but hardly ever strays into Transcaspian territory. On passage it is probably extremely common in the Tomsk Government, whence, through the kindness of Professor N. F. Kashchenko, I obtained nine heads of specimens taken in the neighbourhood of the city of Tomsk on May 15, 1902, all of which proved to belong to the typical yellow-billed goose. Hence it is quite possible that the "black" geese which, according to a communication of Mr. Yablonsky,[2] nest in the taiga (so-called "chern" or black wood), near Barnaul, and which I doubtfully assigned to *Melanonyx segetum serrirostris*, partly belong to yellow-billed *M. arvensis* as affirmed by the author in question. It happened, however, that the specimens of *M. arvensis* sent by Professor Kashchenko from Tomsk came into my hands much later than those of *M. segetum serrirostris* sent from Barnaul by the same donor, and that I had consequently completed the article on the former before I received the latter. Personally I think that, in the Tomsk Government and locally in that of Irkutsk, both species may breed, and that both are probably known by the same name—*gus chernevoi*.

Probably *M. arvensis*, as distinct from *M. segetum*, winters in some parts of Transcaucasia, as, for example, in the valley of the Kura; but it seems not to occur at all in winter on the shores of the Caspian, the fauna of which is, however, still imperfectly known. On the other hand, in the Crimea it winters on the Sivash, and doubtless on other shores of the Black Sea,—even worse known zoologically than the Caspian. It also winters throughout the northern part of the Mediterranean basin. From Egypt it is, however, completely absent. In Western Europe this goose is almost everywhere abundant as a migrant, wintering in the more temperate districts, such as Spain, where, however, its numbers are incomparably less than those of the grey-lag or the white-fronted goose. Considerable numbers pass the winter in Great Britain, where the species is usually not recognised by either sportsmen or ornithologists as distinct from the bean-goose. Owing to the kind assistance of Mr. Frohawk, I am, however, now able to state that the great majority of geese wintering in Great Britain, and known as bean-geese, belong to this species and not to *M. segetum*.

Without having seen specimens from those places, it is impossible to say to what species belong the bean-geese sometimes met with on the island of Madeira and in Iceland, but, for certain reasons, I think they will prove to be yellow-bills. That the number of the two species of bean-geese wintering in Great Britain is continually diminishing, owing to the increase of the pink-foot (*M. brachyrhynchus*), seems evident from the literature on

[1] As it was evidently met with there by Middendorff.

[2] *Priroda i Okhota*, 1902.

the subject. This is explained by English ornithologists as due to the contraction of the range of the former species, in consequence of the ever-increasing area under cultivation. It is probable, indeed, that at the beginning of the nineteenth century the yellow-bill bred in Great Britain, and that it was then distinguished locally, under the name of the carr-lag, from the grey-lag. It was on this ground that Mr. Strickland described it under the name of *Anser paludosus*; and if the *A. paludosus* figured by Mr. Coburn in the *Zoologist* of 1902 really represents the bird which Mr. Strickland described under that name, there is not the least doubt that this is the same as *Melanonyx arvensis* of Brehm.

On migration the yellow-billed goose occurs, and always in considerable numbers, over the whole of the continent of Western Europe, where it is everywhere more abundant than *M. segetum*. Whether or not this goose strays in winter into Eastern Persia and Northern India remains at present a moot question. It must, however, be borne in mind that although there is nothing improbable in the bird occasionally visiting India, yet it certainly does not regularly winter there. On the other hand, a more probable explanation is that in India specimens of *M. neglectus* have been taken for this goose.

In the notice on the bean-goose I have already expressed my opinion as to the erroneous determination of the countless flocks recorded from the Volga and Kama. I think, indeed, that the majority of the migrants there will prove to belong to the yellow-billed species, and that the colouring of the bill of young individuals, so nearly resembling that of *M. segetum*, will be found to be the chief cause of the confusion.

If the yellow-billed species occurs on migration almost everywhere in European Russia and Western Europe, this by no means proves that it halts everywhere on its way. It hardly, for example, alights at all in those parts of the Azov district where for many years in succession I observed vast flights of grey-lags, and of greater and lesser white-fronted geese. A statement by Mr. F. K. Lorenz to the effect that in the Moscow Government the yellow-billed species is an ordinary migrant, while the bean-goose is rare, indicates that this ornithologist is one of the few who distinguish between these geese. The countless gaggles observed on passage (especially during the spring migration, when large numbers are taken) on Lake Ilmen belong almost wholly to the yellow-billed goose; and the same may be said with regard to the flocks visiting the Ryazan Government and the whole of Turkestan.

Personally, it is matter for regret that neither Mr. Seebohm, Mr. Trevor-Battye, nor other explorers of the bird-fauna of the North were able to distinguish between these two geese. Had they done so, they might have thrown much light on the question of their geographical distribution, while, as it is, their observations and labours are almost valueless in this respect. It may be added that in the summer of 1902 Mr. Buturlin, during a visit to Kolguev, obtained a few examples of this goose, which nests there in company with *Melanonyx segetum*.

In concluding the subject of geographical distribution, I may remark that I am absolutely unable to give even approximately exact details, owing to the fact of this species having been confounded with the bean-goose.

As regards its nidification, Mr. G. F. Göbel has given me the following information. "*M. arvensis*," he writes, "builds its nest in Lapland, according to Liltenstjern, for the most part in marshes among woods. This it constructs of various dry vegetable substances, or selects a large tussock of grass.[1] A fine clutch consists of six eggs.[2] Information to this

[1] On the top of such a tussock the goose makes a simple depression, and lines it with dry plants and a small quantity of down.

[2] Probably sometimes more.

effect was given me by Notozero Laps, and by the forester Kormilov at Povenets, on the northern extremity of Lake Onega, who in 1879 had a yearling female hatched from the egg by a hen. This goose, which was remarkably tame, associated with a common drake; and on seeing the latter would at once run after and follow him about like a dog through the yard, and in the street.

"I saw two equally tame geese brought in the summer by Mr. N. A. Smirnov from Novaia Zemlia, and living on an enclosed grass-plot near the station on Catherine Island.[1]

"*M. arvensis* is very easily tamed, and might become perfectly domesticated and replace *Anser anser domesticus* in the North, especially as the latter breeds badly there."

In regard to the eggs, I give a table of measurements and weights drawn up by Mr. Göbel, based on 24 specimens from Lapland (Lake Cholme and River Paza).

Max. breadth 59 mm. (= 2.32 in.), with 84 mm. (= 3.30 in.) length, and 1320 cgrm. weight.
Min. „ 54 „ (= 2.12 „), „ 75 „ (= 2.97 „) „ „ 1092 „ „
Max. length 87 „ (= 3.42 „), „ 55.5 „ (= 2.18 „) breadth, „ 1296 „ „
Min. „ 74 „ (= 2.91 „), „ 54 „ (= 2.12 „) „ „ 1092 „ „
Max. weight 1338 cgrm., with 58 mm. (= 2.28 in.) breadth, and 84 mm. (= 3.30 in.) length.
Min. „ 1074 „ „ 56 „ (= 2.20 „) „ „ 78 „ (= 3.07 „) „

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24 eggs: mean breadth 56.2 mm. (= 2.21 in.); max. breadth 59 mm. (= 2.32 in.); min. breadth 54 mm. (= 2.12 in.).
24 „ „ length 81.9 „ (= 3.22 „); „ length 87 „ (= 3.42 „); „ length 74.5 „ (= 2.93 „).
21 „ „ weight 1254 cgrm.; „ weight 1338 cgrm.; „ weight 1074 cgrm.

As regards the colouring and structure of the shell, reference may be made to the notes on eggs in the Appendix.

[1] The geese brought by Smirnov, here spoken of by Mr. Göbel, according to the skin of one of them, now in the Zoological Museum of the Imperial Academy of Science at St. Petersburg, belonged to *M. segetum*.

MIDDENDORFF'S GOOSE

Melanonyx arvensis sibiricus, Alphéraky

Plate 10

English—*Middendorff's Goose* (Sclater).
Russian—*Bolshoi gumennik* (Yakutsk, *teste* Maak); *zheltogolovy gus* and *zheltogolovy gumennik*; *lesnoi gumennik* (on Boganida, *teste* Middendorff); *ryzhegolovy gumennik* and *vostochno-sibirski gumennik* (Buturlin).
Mongol—*Shara-khusár-kholòn* (Transbaikalia, Kirilov).
Buryat—*Shara-khazyúr-galùn* (valley of Irkut—*zheltogolovy gus*).
Yakut—*Kalkhalkh* (Schrenck).
Kamchadal—*Giét* (label on specimen brought by Voznesensky).
German—*Sibirische Acker-Gans*.

Anser grandis, Middendorff (*nec* Pallas), Bull. Phys. Math. Ac. Sc. St.-Pétersburg, iii. No. 19, p. 298 (1844); *id.*, Sib. Reis., ii. p. 225, pl. xx. fig. 1, 1851; Schrenck, Reis. Amur-L., i. p. 462 (1860); Radde, Reis. S.O. Sib., ii. p. 354 (1863); Elwes, Proc. Zool. Soc. London, 1873, p. 649; Taczanowski, J. f. Orn., 1873, p. 108—1874, p. 336—1875, p. 256; Maak, Putesh. Amur, Prib., p. 143 (1859); Kirilov, Okhota i Okh. Khozyaistvo v Zabaikalye ("Prir. i Okh.," 1902, iii.).
Anser middendorffii, Severtsov (*partim resp. Sib. or.*), Vert. i Goriz. raspr. Turk. Zh., pp. 70 and 149 (1873); Dresser, Ibis, 1876, p. 416; Oates, Man. Game Birds of India, ii. p. 76 (1899); Buturlin, Dikie Gusi Ross. Imp. ("Psov. i Ruzh. Okh.," Feb.-April 1901); *id.*, separ., p. 31 (1901).
Anser middendorffii, Menzbier, Put. d'ra Slyunina, "Okhotsko-Kamch. Krai," p. 346 (1900).
Anser segetum middendorffii, Buturlin, Sinopt. tabl. Pt. Ross. Imp., p. 44 (1901); Khomyakov, Ptitsy Ryaz. gub. (*partim*) v Mater. dlya pozn. Faun. i Fl. Ross. Imp., Otd. zool., pt. 5, p. 34, pl. ii. fig. 3 (Yakutsk).
Anser segetum, var. *serrirostris*, Taczanowski (*nec* Swinhoe), J. f. Orn., 1874, p. 333.
Anser segetum, Swinhoe (*partim*), Ibis, 1875, p. 456.
Anser segetum serrirostris (*partim*), Seebohm, Hist. Brit. Birds, iii. p. 494 (1885); *id.*, Birds of Jap. Emp., p. 236 (*partim*), 1890.
Anser segetum middendorffii, Nikolsky, Ostr. Sakh. i yego F. Pozv., p. 224 (1889); Taczanowski (*partim*), Faune Orn. Sib. Or., p. 1098 (1893); Dybowski, J. f. Orn., 1868, p. 338—1873, p. 108—1874, p. 336—1875, p. 256; Pleske, Ornith. Ausb. Exp. Gebrüd. Gr.-Grzym. Centr. As., St.-Petersb., 1892, p. 298.
Anser serrirostris middendorffii, Salvadori, Cat. Birds Brit. Mus., xxvii. p. 102 (1895).
? *Gus*, Yablonsky, Zhurn. "Prir. i Okh.," 1891, vii. (Okh. v Min. uyezde Yenis. gub., p. 58) (*segetum serrirostris*?).

My notice may commence with a statement of the grounds which induced me to give a new name to this goose, known since the appearance of Severtsov's work (*Vertik. i Gorizont. raspr. Turkest. Zhiv*, 1873) under the name of *Anser middendorffii*. In the notice of the yellow-billed goose I have included Severtsov's name of *A. middendorffii* among the synonyms of the latter, and my reasons for so doing may now be given.

Severtsov made several mistakes in describing *Anser middendorffii* from Turkestan

specimens, mainly because he generally confounded the species *M. arvensis* and *M. segetum*. Another error is the statement that the Turkestan *A. middendorffii* was identical with those East Siberian geese which Middendorff, Schrenck, and Radde regarded as *Anas grandis* of Pallas.

Attention may also be directed to the author's inaccurate measurements of the bills of Turkestan birds, namely, from 1.9 to 2 in. (=48.2–51 mm.), that is to say, dimensions so small that they are not met with even in the smallest of the adult examples of the European representatives of *M. arvensis*. Finally, the most serious misstatement of Severtsov's is that East Siberian geese (*A. grandis*, Midd. *nec* Pall.) winter in Turkestan.

All this at first completely threw me out, and it would hardly even now have been possible to clear up the muddle, were not Severtsov's collection of geese preserved in the Zoological Museum of the Academy of Science at St. Petersburg. From a detailed examination of this material all became clear, although not without some labour.

Not a single example of *M. segetum* from Turkestan is to be found in this collection; while the dimensions of the bills do not tally with those given by Severtsov. Moreover, not a single specimen from Turkestan is identical with those from East Siberia; while only the largest male from Chimkent, with a culmen-length of 72 mm. (=2.83 in.), exceeds in this respect the largest specimens from the Novgorod Government, the Ilmen, or from Novaia Zemlia only by some $\frac{1}{2}$ or 1 millimetre, a difference too insignificant (for such large birds) to serve for the identification of even this single example with the birds from East Siberia.[1] The hypothesis that geese arrive thence to winter in Russian Turkestan proves therefore to be founded on false data. Accordingly I had no other course than to add the Turkestan *A. middendorffii* to the synonyms of *M. arvensis*, Brehm, and to give a new name to the Siberian form, wrongly held by Middendorff, Schrenck, Radde, and others to be *A. grandis* of Pallas. We are now indeed aware that Pallas's description of *A. grandis*, based on Gmelin's statements, and not upon his own examination of the bird, does not agree at all with the goose here described, but must be referred to *Cygnopsis cygnoides*, and probably to a domesticated or half-domesticated representative of that bird. I have therefore proposed for the East Siberian form of the yellow-billed goose the name *Melanonyx arvensis sibiricus*.

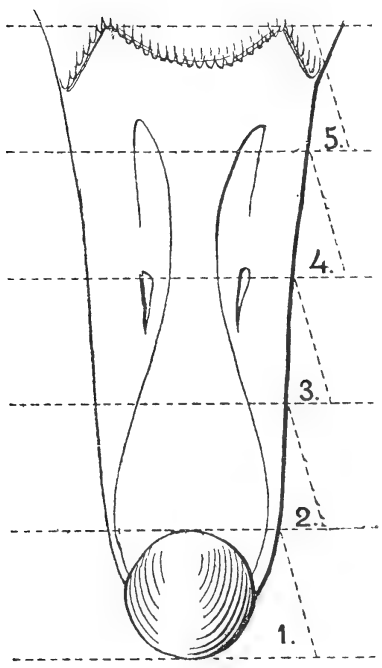
It may be indeed that it would be better to regard this goose as an independent species, and not as a variety or sub-species of the yellow-billed bird; but as the differences consist only of the greater size of the bill and the arrangement of the black and orange colouring (the latter being reduced to a narrow ring, bordering both mandibles terminally), the absence of white feathering along the base of the upper mandible, the somewhat darker colouring of the back, and the slightly larger dimensions of the whole bird, I do not find sufficient grounds for taking this course. Moreover, the fact that with the increase in the length of the bill in typical yellow-billed geese (once the culmen approaches 70 mm. [=2.75 in.]) the yellow-orange colouring rapidly yields to the black, which occupies more than the basal half of the bill, points to a specific relationship existing between these two geese.

As to the sculpture of the bills and relation of the upper nail to the total length of the culmen, shown in the following drawings, the two forms of this goose offer no essential difference.

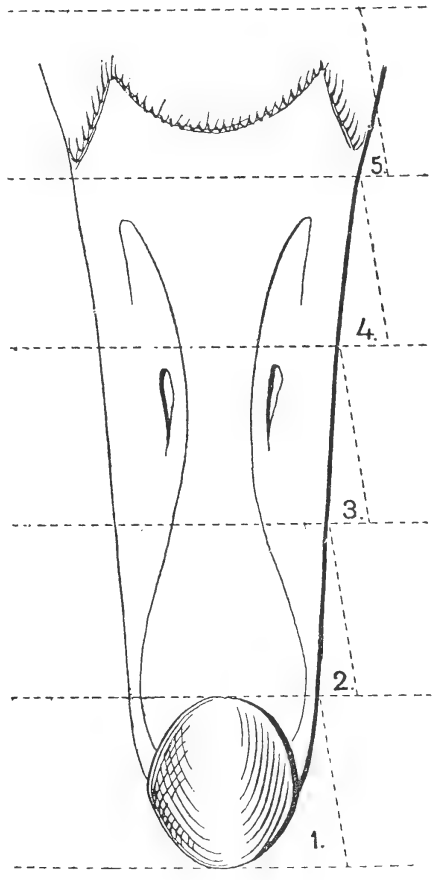
[1] Mr. Buturlin mentions yellow-bills in the Novgorod Government with bills of more than 70 mm. along the culmen, and himself brought from Novaia Zemlia in 1902 a bill with culmen 71½ mm. (=2.81 in.).

Adult Birds

Head and neck grey-brown, for the most part with strong rufous, coffee, or grey-bay tint. A male from Amurland,[1] figured in the plate, has even a golden-buff colour on the head and neck, and apparently such examples are far from being of rare occurrence locally in East Siberia, as indicated by the name, "yellow-headed goose," met with among native appellations in Transbaikalia. All these various tints are evidently of accidental origin, and are just as often present in different individuals as absent. They are doubtless caused by the same factors as the rusty or yellow tinges on the heads of swans, ducks, and other species of geese.



M. arvensis, ♂
Culmen 66 mm.
(Central Russia.)



M. arvensis sibiricus, ♂
Culmen 82 mm.
(Transbaikalia.)

Sometimes this secondary colouring is limited to the head alone, or to the head and neck, but in other cases, although less often, it extends more or less regularly to various parts of the plumage of the body. Owing to the kindness of Professor M. A. Menzbier, I was able to examine an example of *M. arvensis* in his collection, obtained in the Moscow Government, which has a rufous tinge on the head and, here and there, on the neck and body, and in which the feathering embracing the base of the bill is bright rusty colour.

In the rest of the plumage, except for a more uniform dark brown colouring on the upper surface of the body (which again must be verified by a large number of specimens), the eastern form does not differ from the type. Even in dimensions, with the exception, of course, of the bill and feet, *M. arvensis sibiricus* almost agrees with large examples of *M. arvensis*, and, it would seem, also in weight rarely exceeds them. In absolutely all the specimens I have examined the yellow colouring of the bill was concentrated on its apical part, forming a ring round both mandibles, and beginning immediately behind the nail of the upper mandible. The breadth of this ring is somewhat variable, and occasionally very small, as, for example, in the specimens figured by Middendorff (*Sib. R.*, pl. xx. fig. 1) and by Khomyakov (*Pt. Ryazansk. g.*, pl. ii. p. 3), and only occasionally does the yellow-orange colouring of this ring reach back to the anterior edge of the nasal depressions. Indeed, I do not know a single instance of the yellow colouring from this ring projecting in a wedge backwards under the nares or along the edge of the upper mandible, as is always the case in the yellow-billed goose, after the second year. The whole of the remainder of the bill in the Siberian goose is black. Although I have already mentioned the fact elsewhere, I deem it not superfluous

[1] Obtained by G. T. Radde, and now in the British Museum.

to repeat that the black, which at times extends somewhat backwards from the nail on to the anterior part of the orange ring, must by no means be taken for the beginning of the black nail of the upper mandible. With careful scrutiny it is easier to ascertain where the posterior edge of the nail runs in the specimens in which it is less clearly marked than in those in which it is sharply defined.

In not a single example of the Siberian form have I seen a white border along the base of the bill, although I admit the possibility of this appearing in some cases, but only to a very limited degree, that is to say, with separate plumules. In the majority of cases the number of teeth on each side of the upper mandible in the Siberian race varies between 26 and 30, but examples occur in which they do not exceed 24 in number. I give below a table of measurements of the bill of this goose, showing the limitations within which I have hitherto been able to follow the fluctuations in the proportion of the culmen-length of the upper mandible, the greatest depth of the visible part of the lower, and the number of teeth along the edges of the upper mandible. Unfortunately, in the majority of cases the sex of the birds was not noted on the skins.

Sex.	Culmen.	Depth of lower mandible.	Number of teeth, upper mandible.	
	mm. in.	mm. in.		
♂	82 = 3.22	12 = 0.47	...	? E. Siberia; probably Taimyr peninsula.
♀	74 = 2.91	10 = 0.39	30	Kamchatka; Voznesensky, "Giet"; head rusty.
?	75 = 2.95	10 = 0.39	24	R. Moniero. Czewakinski; head brown rusty.
?	75 = 2.95	...	26	R. Tunka, Radde; head very rusty.
?	83 = 3.26	11.3 = 0.44	28	Bering Isl.; Grebnicki; head brown.
?	78 = 3.07	...	30	? Taimyr peninsula.
?	82 = 3.22	9 = 0.35	...	Kamchatka; Voznesensky.
? ♂	83 = 3.26	10.5 = 0.41	28	Radde; Amur; head and neck bay.
?	78 = 3.07	...	...	Yakutsk; M. A. Menzbier coll.
? ♀	76 = 2.99	10 = 0.39	29	Adycha (Yana); Bunge; head dark coffee.
? ♀	74 = 2.91	9 = 0.35	28	Yakutsk; M. A. Menzbier coll.; head dark coffee.
♂	77 = 3.03	9 = 0.35	28	Yakutsk; M. A. Menzbier coll.; head coffee-brown.
♀ juv.	64 = 2.51	8 = 0.31	25	Su-Chou; Brothers Grum-Grzymailo expedition.

Young Birds

Of these I know nothing, except the above-mentioned female from Su-Chou, which I regard as a bird in first plumage or a yearling, but not more. The plumage is duller and all the feathers are narrower than in adults.

In some specimens, which apparently are not quite mature, there are a few white plumules on the chin, and in one the whole mental angle is white; but even in this example there are no traces of white plumules at the base of the bill.

As to the young in down, I have no information.

The dimensions of the adult birds are compiled from authors who have written on this goose, and from the material at my own disposal.

Total length		780–930 mm. (= 30.07–36.60 in.).
Spread	up to	1390 mm. (= 54.70 in.).
Wing		450–505 mm. (17.70–19.80 in.).
Culmen		74–83 mm. (= 2.90–3.26 in.).
Depth of bill at base		36–38 mm. (= 1.41–1.49 in.).
Breadth of bill at base	*circa*	31 mm. (= 1.22 in.).
Breadth of bill (middle of nares)		25 mm. (0.98 in.).

Greatest depth of lower mandible seen from without with shut bill		9–12 mm. (= 0.35–0.47 in.).
Tarsus		74–84 mm. (= 2.91–3.30 in.).
Middle digit without claw		73–76 mm. (= 2.87–2.99 in.).
Claw of middle digit	*circa*	16–17 mm. (0.63–0.66 in.).

Number of teeth on each side of upper mandible, 24–30; 24 I met with only once.

Geographical Distribution

Although, in consequence of the confusion of this goose with large specimens of other representatives of the genus *Melanonyx* (*M. segetum serrirostris* and *M. mentalis*), the range is not fully ascertained, yet it may be asserted with confidence that the species abounds everywhere in East Siberia, from the Taimyr peninsula eastwards to Kamchatka, Chukchiland, and the Komandor Islands.

How far north it travels to breed cannot yet be exactly determined, but we know that it nests on the River Boganida, on the lower reaches of the Yana, on the Vilyui in the Yakut Government, and almost everywhere throughout Siberia between Lake Baikal and the Sea of Japan, near great rivers and lakes southwards to 50° N. lat. and possibly still farther south.

It breeds on the Chukchi peninsula and in Kamchatka, and, probably, in suitable spots along the whole coast of the Okhotsk Sea.

This goose nests alike in the lowlands and on the hills. It migrates to pass the winter in China and Japan, but how far it descends southwards for this purpose we have no idea.

In the notice of the yellow-billed species I have already refused to credit the alleged wintering of the Siberian form in Turkestan, at any rate on the basis of existing data. In like manner not a single case is authenticated of this goose straying into European Russia and Western Europe, although it may of course happen that such a visit takes place. It is recorded, for instance, that a specimen of *Nyroca bæri*, Radde, was killed in 1901 near Tring.

Neither is the western boundary of the nesting area of this species in Siberia yet established. Middendorff, indeed, found it on the Boganida, but it is quite possible that it breeds even still farther west, thus meeting the typical yellow-billed species.

This goose arrived on the Tarei-nor, according to Radde, simultaneously with the grey-lag (*Anser anser*) at the end of March, so that it is among the first of the geese; but on the Irkut, in the same year, it arrived in May, which must probably be ascribed to chance. On the Boganida it appears, according to Middendorff, in flocks at the same time as *M. segetum* (= *arvensis*?), to the note of which species its own is similar, although hoarser. It also moults simultaneously with the latter, and consequently breeds at the same time. According to the statements of the natives, this goose dives excellently, so that it is captured only with difficulty by the fowler.[1]

With regard to its breeding on the Vilyui, Mr. Maak remarks that: "It builds its nest near the Vilyui and its tributaries, on lakes far removed from habitations, and young in down were found as early as June 8. Moulting usually continues till the beginning of August; on July 29 I found moulting birds, while on August 4 on the Khaingia (65° N. lat.) some flocks of this species were already flying.

"This observation is in complete accord with the statements of the local Tungus,

[1] Of course fowler here must be understood to mean the trader, who takes his geese while moulting.

who remain in this district till that time (August 1) and kill the geese with their dogs. On August 7 a female was killed on the Khaingia which had not yet completely finished moulting, and weighed 8½ lbs."[1]

Of the eggs of this goose, I give measurements of Daurian specimens (from Aksha) according to Taczanowski. In colour the eggs are almost white or yellowish, but after being brooded they become dingy yellowish, and are blotched with grey.

Breadth	53.2	mm.	(= 2.09	in.),	length	73.6	mm.	(= 2.89 in.).
„	53.6	„	(= 2.11	„),	„	78.2	„	(= 3.07 „).
„	55.8	„	(= 2.19	„),	„	81.5	„	(= 3.20 „).
„	55.3	„	(= 2.17	„),	„	82	„	(= 3.22 „).
„	57	„	(= 2.24	„),	„	85	„	(= 3.34 „).
„	57.3	„	(= 2.25	„),	„	88.4	„	(= 3.48 „).
„	59	„	(= 2.32	„),	„	90	„	(= 3.54 „).

I add the following notes, from Mr. G. F. Göbel, on three examples of eggs, very probably belonging to this goose, the property of the Zoological Museum of the Academy of Science at St. Petersburg.

"The eggs from Siberia are of the size of large specimens of the grey-lag (*Anser anser*), but with the well-marked structure of the shell of a bean-goose (*Melanonyx*). I give their dimensions, as they probably belong to *M. arvensis sibiricus*.[2]

"(*a*)	Breadth	62	mm.	(= 2.44	in.);	length	92.5	mm.	(= 3.64	in.);	weight 2070 cgrm.
"(*b*)	„	62	„	(= 2.44	„);	„	91.5	„	(= 3.60	„);	„ 2022 „
"(*c*)	„	61	„	(= 2.40	„);	„	93.5	„	(= 3.68	„);	„ 2082 „

"Mean breadth 61.7 mm. (= 2.42 in.); mean length 92.5 mm. (= 3.64); mean weight 2058 cgrm.

"The length exceeds the breadth by 30.8 mm. (= 1.21 in.), and in form they consequently come nearest to the eggs of *M. brachyrhynchus*."

The measurements given both by Taczanowski and Göbel cannot be accepted as absolutely belonging to eggs of the goose here described, although it is very probable that they are referable to that species.

Although a difference occurs in the size of the eggs described by Taczanowski and by Göbel, it does not exceed the limits of variation which may be met with in different clutches of one and the same species.

The carelessness of egg-collectors, and their ignorance in the majority of cases of the birds themselves, make it impossible to place any reliance on their determination of the species of geese to which their specimens pertain. Accordingly, only when well-authenticated eggs of the Siberian representatives of the genus *Melanonyx* are collected will it be possible to say positively to which the above measurements and weights really refer.

I may conclude this notice with an expression of regret that there are such a large number of fowlers in Siberia who every year have the opportunity of observing and shooting these geese, and who consequently become well acquainted with their habits and manners, and yet so few observations are recorded.

It is true, there are many descriptions of goose-hunts in Siberia in the sporting magazines and books of travel, but in almost all cases the birds are called simply "geese," and there are no indications by which it is possible to even approximately guess the species of which the authors write.

[1] It must be remembered that the females are always considerably smaller and especially lighter than the ganders.

[2] Göbel's MS. has *Anser middendorffii*.

THE BEAN-GOOSE

Melanonyx segetum, Gmelin

Plate 11

English—*Bean Goose*; *Bog Goose*; *Harvest Goose* (this species in England has hitherto been generally confounded with *M. arvensis*).

Russian—*Gus*; *diki gus*; *guménnik*; *gumenník*; *gumyónnik*; *pashenny gus*; *sibiryak* (Kazan Gov., Bogdanov); *temnoklyuvy gumennik* (Buturlin); *gumennik zapadno-sibirsky* (Buturlin); *koltsenosy gumennik* (Kholodk. and Silantyev); ? *gumennik-nemok* (on Kolguev, Trevor-Battye); ? *nemtyr*; ? *nemaya kazarka* and ? *khrushkoi* (Perm Gov., Sabaneev [1]); ? *kamsky gus* (Kazan Gov., Ruzsky).

Samoyed—*Jebtan* (Pechora district,[2] Seebohm).

German—*Kleine Saatgans*; *Ringelschnäblige Saatgans*; *Roggengans*; *Bohnengans*; *Zuggans*; *Wilde Gans*; *kleine Wilde Gans*; *kleine Hagelgans*; *Schneegans*; *Moorgans* (these names taken from Naumann).

French—*Oie sauvage*; *oie des moissons* (names common to yellow-bill).

Anser sylvestris, Frisch, Vög. Deutschl., pl. 155; Artsybashev, Bull. Soc. Mosc., 1859, iii. p. 100; Degl. and Gerbe, Ornit. Eur., ii. p. 487 (1867) (*partim*).

Anser fabalis, Latham, Gen. Syn., Suppl. i. p. 297 (1787); Salvadori, Cat. Birds Brit. Mus., xxvii. p. 99, 1895 (*partim*); Bianchi, "Yezheg. Zool. Muz.," vii. 1902, p. 271.

Anser fabalus (errore), Buturlin, Dikie Gusi Ros. Imp., p. 35 ("Psov. i Ruzh. Okh.," 1901).

Anas segetum, Gmelin, Syst. Nat., i. 2, p. 512, No. 68 (1788); Bechstein, Nat. Deutschl., 2nd. ed., iv. p. 883 (1801).

Anser ferus, Bonnaterre, Encyclop. Méthod, i. p. 110, No. 7 (1790) (Exclus. *a*, *b*).

Anser segetum, Bonnaterre, Encyclop. Méthod, i. p. 116 (1790); Meyer, Taschenb., ii. p. 554 (1810); Erasmann, Ye. I. Or. kr., p. 555 (1868); Naum., Vög. Deutschl., xi. p. 300, pl. 287 (1842); *id.*, Naumannia, 1853, pp. 5-8, pl. i. figs. D, E, F (*rostra*); Palmén, Cab. Journ. f. Orn., xxiv. p. 53 (1876); Menzbier, Pt. Ros., i. p. 741 (*partim*), 1895; *id.*, Prom. Pt. Ros. i Kavk., p. 469, pl. 134 (1902); Pleske, Th., Vóg. Kola Hlbns. Beitr. Kent. Russ. R., ix. p. 235 (*partim*), 1886; Pleske, F. D., Krit. obz. Mlek. i Ptits Kolsk. pol-va, pp. 336 and 341 (1887); Büchner and Pleske, Beitr. Orn. S. P. G., 1881, No. 177; Büchner, Pt. Spb. gub., p. 512 (1884); Kholodkovsky and Silantyev, Pt. Yevropy, p. 522, pl. 42, fig. 2; Buturlin, Tabl. dlya opred. Plastinch. ("Psov. i Ruzh. Okh.," 1900); *id.*, separ., p. 8; Silantyev, Opred. Yevr. Pt., p. 112 (1901); Buturlin, Sinopt. tabl. Okh. Pt. Ros. Imp., p. 44 (1901); Lorenz., Vög. Mosk. Gouv., 1894, p. 58; Sushkin, Pt. Ufimsk. gub., p. 69, etc. (1897); *id.*, Ibis, 1897, iii. p. 5 (*rostrum*); Semenov, "Pr. i Okh.," 1898, vii. pp. 12-13; Somov, Orn. Fauna Khark. gub., p. 443 (1897); Deryugin, Orn. izsl. Pskovsk. gub., "Trudy Imp. Spb. Obshch. Yest.," Otd. zool., xxvii. pt. 3, p. 27 (1897); *id.*, *op. cit.* 1898, p. 111 (*partim* ?); Karamzin, Pt. Sam. i. Ufim. gub., p. 181; Smirnov, Zur Ornis des Barenzmeers ("Orn. Jahrb.," xii. 1901, pt. 6) (*pro parte*); Radde, Ornis Cauc., p. 445 (*partim*) (1884); Nikolsky, Pozv. zh. Kryma, p. 289 (1891) (*partim* ?); Radde (*partim*),

[1] The majority of these names refer also to the yellow-bill.

[2] It must be supposed that in the Pechora district the prevailing species under this name is *M. arvensis*.

"Vestnik Yest. Nauk," pp. 532, 629 (1855); Radde (*partim*), Bull. Soc. Mosc., 1854, iii. p. 160; Palmén, Cab. J. f. Orn., 1876, p. 53; Brauner, Kratk. Opred. Dichi Stepn. pol., pt. i. p. 99 (1897); Ruzsky, Sistem. sp. ptits Kazan. gub. ("Trudy O. Ye. pri Kazan. un.," xxv. pt. 6, p. 116) (1893); Shatilov, "Izvest. Ob. L. Yest.," x. 2, pp. 82, 94 (1874) (*partim*?); Sabaneev, Prolet gusei, "Zhurn. Imp. Obshch. Okh.," 1874 (*partim*); *id.*, Zveri Prom. Uralsk. gor.; "Beseda," 1872, No. vi. pp. 106-107 (*partim*); *id.*, "Bull. Soc. Nat. Mosc.," 1871, ii.; *id.*, Ukazatel, pp. 455-458 (1883); Frohawk, Field, Oct. 4, 1902, p. 605 (*rostrum*); *id.*, Zoologist, No. 740, p. 41, pl. 11 (Feb. 1903).

Adult Birds

In plumage this goose hardly differs from the yellow-billed species, although the whole colouring is generally somewhat darker. Head and neck brown-grey, of various shades in different individuals. Back of neck and breast grey with lighter edgings to feathers; under-parts becoming gradually lighter, and passing behind into white. Flanks brown with white edgings to feathers. Vent and under tail-coverts white. Back and scapulars dark brown with brownish white edgings to feathers, which in old individuals become lighter or even whitish. Rump black-brown; upper wing-coverts white. Tail-feathers brown with broad white edgings and tips. Greater and median wing-coverts black-brown with whitish edgings; lesser wing-coverts uniform brown-grey.

Flight-feathers blackish brown, but, as in all geese, with white shafts, except at the tips, which are dark.

Upper edge of wing and whole of under-side, as also axillaries, very dark slate-grey. Tail-feathers 18 to 20, according to Naumann, although I have never counted over 18. Female generally somewhat smaller and more slenderly built than male.

Although the majority of authors state that at the base of the upper mandible, that is, on the forehead and at the sides of the head, in this goose, there is a white area, I must say I never saw it in any example. The most I have noticed is a whitish indefinite patch on the apex of the forehead; but I have never seen anything in the bean-goose like the white feathering on these parts in the yellow-billed species, and much doubt whether the white ever has any considerable development there in the former. On the other hand, I admit that sometimes adults may have a white patch on the feathering of the mental angle, since I have seen young birds in a collection from Kolguev with white on the chin.

Legs and feet yellow-orange of varying intensity, with black claws; outer claw sometimes very light or even white (probably an individual variation).

The main distinguishing features of the bill of this species are discussed later.

Goslings

Edgings of feathers on upper surface of body and flanks show a decided rufous tint. Not a trace of white plumules at base of upper mandible, but on feathering of mental angle there sometimes occurs a white patch, in rare cases occupying even the whole angle. Feet rather yellow than orange.

Young Birds in First Plumage

Head and neck dark earthy grey; throat somewhat lighter; upper breast earthy grey; the rows of plumules, separated by furrows on sides of neck, have light tips which, as Naumann thinks, are due to remains of down not quite broken off.

Breast with whitish edgings to feathers; under-parts light grey. Flanks, upper part of back and shoulders earthy grey, passing towards tip of feathers, beyond brownish white

edging, into brown. Middle of wing similarly coloured; axillaries and whole under-side of wing dark black slate-grey with slightly lighter edges; primary coverts, primaries, and secondaries dark brown. Latter with narrow white edgings, widening towards the tips. Legs and feet dingy yellowish or grey-yellow.

Young in Down

Scarcely known with certainty; the sole undoubted example, which I had the opportunity of seeing later—when it was fully fledged—was caught, when without a sign of quills, on July 30, 1901, on Kusov Island, at the entry to the Kara Straits off Novaia Zemlia. According to Mr. N. A. Smirnov, who brought this specimen, together with two others (which I did not see), this bird had a predominant light grey colouring; the bill was wholly blackish, and the feet a dead black with dark claws. A month later the feet began to lighten, passing into a yellowish, and a yellow patch appeared on the apex of the culmen.

These young in down were caught among stones on the seashore, and apparently formed part of two united broods. The old birds were in full moult.

So far as I can judge from the comparatively insignificant material at my disposal, and from authentic published data (of which there are very few), the measurements of adult bean-geese are as follows:—

Wing	410–450 mm. (= 16.10–17.70 in.).
Culmen	57–63 mm. (= 2.24–2.44 in.).[1]
Depth of bill at base	31–32 mm. (= 1.22–1.25 in.).
Greatest depth of visible part of lower mandible with shut bill	$7\frac{1}{2}$–11 mm. (= 0.29–0.43 in.).
Tarsus	74–76 mm. (= 2.90–3 in.).
Length of median digit, claw included	80–85 mm. (= 3.14–3.34 in.).
Length of (median) claw	10–12 mm. (= 0.39–0.47 in.).

Number of teeth on each side of upper mandible, in vast majority of cases, 20 to 21, but examples from Kolguev showed a greater number, viz. from 20 to 24, of which more detail is given later.

Bill

I dwell at considerable length on the description of the bill of this species, since it affords the best characters for distinguishing it from the yellow-billed goose. Naumann first analysed in detail the difference in the structure of the bills of these two geese, and, following his description, I have succeeded in finding another essential characteristic which had escaped the attention of the German ornithologist, and so far, at any rate, has proved very constant and, therefore, important.

In the bean-goose the bill is absolutely and relatively smaller, shorter, and thicker than in *M. arvensis*, and at the same time of a more conical form, that is, its sides meet at a more acute angle with the apex. The character which I found to be very constant consists in the fact that, if the bill be looked at from above, the apparent length of the nail in adult birds of *M. segetum* is contained in the total culmen-length not more than $3\frac{1}{2}$ times, in younger birds between $3\frac{1}{4}$ and $3\frac{1}{3}$ times, while in *M. arvensis* this same nail is contained in the culmen in adults up to $4\frac{1}{2}$, and in young birds 4 times.

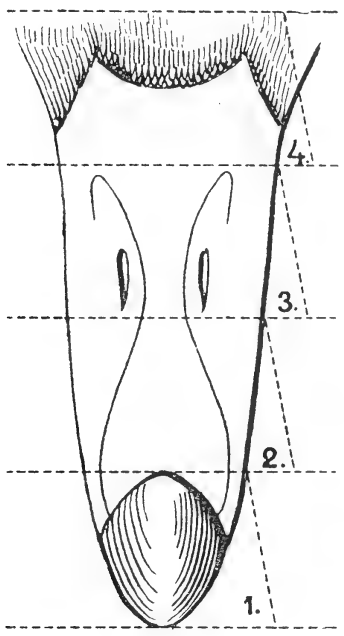
To show this more clearly, I give drawings of the bills of adult birds of both species. The importance of this character is indicated by the fact that the same relations

[1] The longest bill I have measured is 61 mm. (= 2.40 in.), and belonged to a large full-grown specimen from Kolguev.

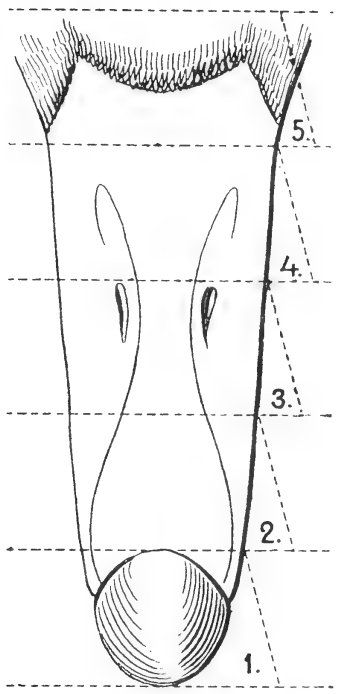
are preserved also in East Siberian representatives of the bean and yellow-billed geese (*M. segetum serrirostris* and *M. arvensis sibiricus*), as we see from the description of the latter.

The nail of the upper mandible in *M. segetum* is narrower and sharper than in *M. arvensis*. The upper mandible between the posterior edge of the nail and a line uniting the anterior angles of the nasal depressions is nothing like so depressed in *M. segetum* as in *M. arvensis*, but rises like a roof, so that, as seen from the side, this part of the bill in the former is higher (thicker) than in the latter species.

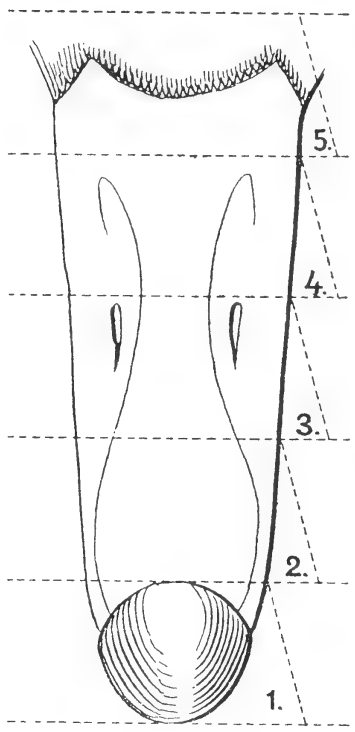
The same may be said of the basal part of the culmen, which is less flat in the bean than in the yellow-billed goose. The lower mandible in *M. segetum* is perceptibly more arched, while its greatest depth, seen from without when closed, is not only comparatively but absolutely greater. The nasal depressions, according to Naumann, are comparatively shorter, and the nasal apertures smaller, although having a wider lumen in their posterior part.



M. segetum, ♂
Culmen 60½ mm.
(Northern Russia.)



M. arvensis, ♂
Culmen 66 mm.
(St. Petersburg.)



M. arvensis, ♀
Culmen 70 mm.
(Ryazan.)

In reality, then, the differences in the structure of the nares, pointed out by Naumann, are very minute, and, although they cannot be denied, are insufficiently marked to serve as trustworthy characters in distinguishing between these two geese, and particularly in the case of dry skins, when in consequence of shrinking the form of both the nasal depressions and the apertures changes so much.

In regard to the number of teeth in the upper mandible, on which Naumann insists when distinguishing these two geese, I must say that at first I fully shared the view of this ornithologist, as when examining all the bean-geese at my disposal I found that there were from 20 to 21 on each side of the upper mandible. But the specimens of *M. segetum* brought by Mr. Buturlin from Kolguev in 1902, and the geese of the same species obtained by Mr. Pike in Holland in January 1903 and sent to the British Museum, showed that the number may reach 24, or perhaps even 25. In my opinion, as stated in the Introduction and elsewhere in this volume, the majority

of the bean-geese at first examined were young birds, while among the specimens brought by Mr. Buturlin the number 24 occurs exclusively in old birds.

Among the eight Kolguev geese, in one example there are 20 teeth on each side of the upper mandible; in two, 21; in one, on one side 21, on the other 22; in two, on one side 22, on the other, 23; and in two, 23 on one side, and 24 on the other.

Of the four bean-geese from Holland mentioned above, according to Mr. Frohawk, two examples had 21 on each side; in one, there were 21 on the right side and 22 on the left; and finally in one gander there were 24 teeth on each side.

On finding that the Kolguev geese had such a number of teeth, I thought this apparent anomaly might be ascribed to the interbreeding in Kolguev between yellow-billed and bean-geese; but I no longer hold this opinion, as I have found a similar variation in the number of teeth in other geese.

On the whole, I may say that as the number of teeth is not constant, it cannot be considered as an absolutely good distinctive character to differentiate the bean-goose from the yellow-billed species, but it may yet serve as an auxiliary character in discriminating between young birds of these two species, in which the pattern on the bill is very similar.

Accordingly, if we see a young goose of this group with 20 or 21 teeth on each side of the upper mandible, we may be almost certain that we have to do with *M. segetum*, and the further examination of the bill, that is, the relation of the nail to the culmen-length, will not fail to confirm this; in like manner, if we have a young goose with 24 or 25 or more teeth on each side of the upper mandible, we may safely assert that it is not *M. segetum*.

If we add to this difference in the bills of these two species the fact that, in the vast majority of cases, in *M. segetum* the yellow or yellow-orange colouring[1] is concentrated on the apical part of the bill, while in *M. arvensis* it prevails over the black (I here speak of adults), I think these differences will suffice (when taken together) to discriminate with complete certainty between the bean and the yellow-billed goose, in spite of the considerable degree of individual variations to which the bills of these two geese are subject.

The figures of the bills of these two species given on Plate 23 of this work show these differences still more clearly, and, I hope, will serve in the future to remove the confusion which has reigned in this group of geese for more than a century, notwithstanding the clear explanation of their differences given by Naumann in 1842.

In conclusion, I may refer to the question whether specimens of the bean-goose ever occur in which the colouring of the yellow-orange band on the upper mandible extends beyond the nasal apertures and stretches more or less back along the tomia. No such examples have ever come into my hands, but that they do occasionally occur is demonstrated by a sketch by Mr. Frohawk of a bill of this type from a goose killed in England, and also from the fact that similar individuals have been brought by Mr. Buturlin from Kolguev.[2]

[1] For the colouring of the bill in this species, see Appendix entitled "Novaia Zemlia Bean-Goose."

[2] Since this was written, my son shot a specimen of this species in the mouth of the Neva, in April 1904, with the yellow colour on the bill extending far back under the nostrils.

Geographical Distribution

Owing to the almost universal confounding of the bean with the yellow-billed goose, it is still impossible to determine exactly either all the nesting areas or all the routes of migration, and the winter haunts of the former bird.

In spite of the assertions of certain ornithologists and sportsmen that this goose migrates in some districts in spring or autumn in large flocks, such statements must be treated with great caution, and even sometimes with incredulity, and it is wise to consider the exact range of the species as practically unknown.

The fact is that, in the arrangement of the black and yellow-orange colouring on the bill, young yellow-billed geese (especially before attaining two years) are very like adult bean-geese, and may even be easily mistaken, on a superficial inspection, for old birds of this species, since, notwithstanding their youth, they do not yield in size to the latter.

Thus if we confine ourselves, as do the majority of observers, to the pattern on the bill, the confusion between these two species is easily understood; and beyond doubt such confusion has often occurred. I again repeat, therefore, that it is impossible from the information at present existing to get an exact notion of the habitat of these two species, so like to each other at first sight, but in reality perfectly distinct.

One fact is, however, proved, namely, that the geographical distribution of *M. segetum* is far from always coinciding with that of *M. arvensis*: on the contrary, it is slightly more restricted; while, on the whole, the bean-goose is incomparably less numerous than the yellow-billed species.

In Lapland, for example, on the Kola peninsula, and also in Finland, as noted by Dr. Palmén (and afterwards by Mr. F. D. Pleske), the majority of statements as to the bean-goose being found there must be received with more than mistrust. It is, indeed, probable that only the most insignificant percentage of these records really refer to this species, and the great majority to the yellow-bill. Only recently, that is since Mr. Buturlin's expedition to Kolguev in 1902, have we ascertained (from the material brought back by that energetic and talented explorer) that this species breeds on that island, in company with *M. arvensis*. True, we knew that Mr. Trevor-Battye had found it on Kolguev, but we could not be sure whether the bean or the yellow-billed species was the one mentioned by that author under the name of bean-goose, since he brought home no material proofs,[1] and in England, till recently, these two species were universally included under the name of bean-goose. On the other hand, from Mr. Trevor-Battye's description of some specimens of these Kolguev bean-geese, we are entitled to assume that, besides the yellow-billed and the bean-goose, Sushkin's goose also breeds on the island in question, as in Novaia Zemlia, where all three nest together. Novaia Zemlia appears, indeed, to be a well-authenticated breeding-ground for the bean-goose, as specimens were obtained there by Mr. N. A. Smirnov in 1901.[2]

In other words, for the north of Russia and Europe generally, we can only say that Kolguev and Novaia Zemlia are authenticated breeding-grounds of this species; this, perhaps, being the reason why we so seldom meet with specimens of the bean-goose in collections, while the yellow-billed goose is always comparatively well represented.

Of Lapland, apparently, this species is not a native, even in the breeding season, and

[1] As testified by a letter from the author in my possession.

[2] The heads in spirit, and the skin of a young bird in first plumage, brought by Mr. Smirnov, are in the Zoological Museum at St. Petersburg. These specimens were quoted in vol. vii. of the *Yezhegodnik Zool. v muzeya Akad. Nauk* (1902, p. 271) by V. L. Bianchi as *Anser fabalis* (Lath.).

probably occurs there only on migration, and even then in very limited numbers. The same, probably, is the case with Finland. In the Novgorod Government, even if it be met with on migration (on the Ilmen, for example), it occurs in any case in insignificant numbers compared with the countless hosts of *M. arvensis*. I can indeed testify that the so-called specimens of *M. segetum* brought from there proved to be young yellow-billed geese, with the black prevailing over the yellow-orange on the bill, as is always the case in young birds (up to 2–3 years) of *M. arvensis*. In the Moscow Government, according to Mr. F. K. Lorenz, the present species is very rare as a migrant compared with other kinds. That it is found in the Kharkov Government more frequently than *M. arvensis*, as stated by Mr. N. N. Somov, I am compelled to doubt on strong grounds, as also the assertion of authors who affirm that on the Middle Volga, in the Simbirsk and Kazan Governments, it occurs in abundance on passage, predominating over the yellow-billed species.

Although I have not sufficient data to absolutely refute such statements, I prefer to await more precise information, and to see specimens from the spots where these geese are supposed to occur in such numbers.

We have already seen that the so-called *M. segetum* recorded by Mr. Khomyakov from the Ryazan Government turned out to belong to *M. arvensis*, and the same result followed, on examination, in the case of the Turkestan bean-geese in Severtsov's collection. Accordingly, I have good grounds for regarding with distrust the statements of their abundance on the Middle Volga, and in the Kharkov Government, and therefore believe that in each case young dark-billed specimens of *M. arvensis* were taken for adults of *M. segetum*. It must also be borne in mind as being quite possible that some of the migrating bean-geese recorded, for example, from the Kama, actually belonged not to this species, but to Sushkin's goose (*M. neglectus*), described by Dr. Sushkin, and encountered by him in large numbers on passage in the Ufa Government.

On the whole, then, from a careful study of the question, I conclude that, alike in European Russia and in Western Europe, and (so far as can be judged at present) in Western Siberia, the bean-goose is by far less numerous than the yellow-billed species.

On migration, *M. segetum* reaches eastwards to Lake Baikal, as proved by two skins from Kultuk; but it must be inferred that it arrives there from breeding-grounds lying to the west of the mouths of the Yenisei, as, starting from the Taimyr peninsula eastwards, it is apparently everywhere replaced by the thick-billed variety (*M. segetum serrirostris*), which is described later. That some of the geese breeding in the Far North fly west or south-west, and others south-east, cannot be doubted; and it is, probably, the eastern migration-route of the bean-goose that passes near Lake Baikal. Where *M. segetum*, when migrating this way, has to go to reach its winter haunts, is difficult to say, but since it must be supposed that it winters in some part of China, it seems probable that both the typical form and its Eastern representative, *serrirostris*, may there winter together.

I have not identified the typical *M. segetum* from East Siberia, although many travellers write of its existence there in incredible numbers. Consequently, one of two things must be the case: either all the bean-geese of East Siberia taken by travellers for *M. segetum* belong to *M. segetum serrirostris*, or both kinds occur there together. The latter alternative would, of course, be in favour of the specific distinctness of *M. serrirostris*.

On the other hand, if the typical bean-goose were really met with on passage and

nesting (in large numbers) in East Siberia, how are we to explain the fact that I have not found a single example in all the collections I have examined? On these grounds, I come to the conclusion that in East Siberia, where it is generally known under the name of bean-goose, there exists not the typical *M. segetum*, but its thick-billed representative, first noted by Gould [1] and afterwards described by Swinhoe as *M. segetum serrirostris*.

Especially interesting is the fact that the latter form occurs even far more west than Lake Baikal, as is proved by specimens obtained on passage in April near Barnaul and kindly forwarded to me by Professor N. F. Kashchenko, of Tomsk University. Thus, if it be admitted that some of the typical *M. segetum* breeding in the Far North travel south-west to winter, and some south-east, and also that this species nests in Russia only between 44° and 80°,[2] it will be easily understood why it is not met with in Turkestan, or (if it occur there) only as a rare and occasional straggler. The two divergent routes of its passage must avoid Turkestan; and there is thus no possibility of the species getting there, with its given breeding-range.

Only if these geese travelled straight from north to south, could we expect them to occur in Turkestan. That some flocks of *M. segetum* from the Far North fly south-west is beyond doubt, and the flocks of these geese occurring in Western Europe are certainly all of Russian origin. Where, then, we may ask, do these masses of bean-geese seen on passage on the Kama and the Middle Volga pass the winter?

We know that neither in the Transcaspian nor in the Caspian region (with Leukoran and the whole western shore) does this species occur, either on migration or in winter, and if it is recorded from Transcaspia as a rare bird, this is in all probability in error for *M. arvensis*. In the valley of the Kura, in Transcaucasia, Dr. G. T. Radde saw, during warm winters, many bean-geese, but we do not know of what species, since, in his *Ornis Caucasica*, this author declares that he unites *M. segetum* and *M. arvensis* in one species, on the authority of Mr. Dresser.

In the Azov district representatives of the genus *Melanonyx* are so scarce on both migrations that they are quite lost in the masses of greater and lesser white-fronted geese, and practically never fall to the gunners, at least in those parts of the region where I shot so many years.

There remain the Black Sea and its shores, but of these we know scarcely anything, and what species of bean-geese winter in the Crimea (on the Sivash and in various bays) we unfortunately have no knowledge, although we may surmise that here are the winter haunts of bean, yellow-billed, and even Sushkin's geese.

From North-east Africa and throughout Egypt the bean-goose is absent; but it winters, apparently, together with the yellow-billed species, in some other parts of the Mediterranean basin. Unfortunately, however, owing to its being confounded with other geese of the group *Melanonyx*, it is at present impossible to ascertain exactly where *M. segetum* occurs in winter. In the vast flooded swamps (marismas and lagunas) of Southern Spain Mr. Abel Chapman met with bean-geese, in the course of a series of years of sport, in far less numbers than the grey-lag; but unfortunately this observer did not discriminate between the two species of the former.

As to Central Europe, there is no doubt that *M. segetum* is met with almost everywhere on passage together with *M. arvensis*, and it is probably a regular migratory species

[1] In MS.

[2] Assuming that it breeds from Kolguev and Novaia Zemlia eastwards to the mouths of the Yenisei.

locally, as, for example, in Hungary. For the reasons above stated I find it, however, quite impossible, without first examining European collections, to ascertain the exact routes of its passage through Europe.

All that I can surmise from the available literature is that the bean-goose in Western Europe is far less numerous than the yellow-billed species. In Great Britain "bean-geese" remain to winter locally in considerable numbers, but till recently they were all, except the pink-footed species, classed under the collective designation of "bean-geese."

Wishing to clear up the matter, I applied to Mr. Frohawk, who readily took up the question; and the result of his investigations was the note, with figures of the bills of the bean and yellow-billed goose, in the *Field* of October 4, 1902. It is there stated he only saw a single example of *M. segetum*, one of a pair killed in Norfolk in January 1884, now in Mr. J. H. Gurney's collection. All the other "bean-geese" shot in England proved to belong to *M. arvensis*. Accordingly it may be safely affirmed that in Great Britain the bean-goose is out of all proportion less numerous than the yellow-billed kind, an inference in complete accord with what I had written to Mr. Frohawk on the subject.

It is, however, quite possible that, besides these two species, Sushkin's goose may also winter in Great Britain, since there is the evidence of specimens which the late Mr. J. Cordeaux could not refer to any one of the described species of this group. Although I have not yet received full replies to my questions on this point, such straying of Sushkin's goose (which, as already stated, breeds in Novaia Zemlia) to England would not be at all surprising.

In Holland, Belgium, France, Germany, Austria-Hungary, Turkey, and Greece *M. segetum* is certainly met with, but everywhere, as it seems to me, in scant numbers as compared with *M. arvensis*.

Here I may quote a circumstance testifying to how little this goose is known in Europe. In answer to my request to send me a skin of a typical bean-goose,[1] I received under that name from a well-known firm, trading in bird-skins, a young white-fronted goose (*Anser albifrons*).

In a word, considerable time must elapse before our knowledge of the distribution of the bean-goose in Western Europe assumes a true shape, and I shall be only too happy if my present work helps to throw light on the question.

In Finland I have not met with this goose, either breeding or migrating; but it can hardly be doubted that it occurs there locally on passage. In regard to Archangel, the Pechora tundra, and Transuralia, we are also still in complete darkness in this respect.

That the species is found sometimes as a migrant near St. Petersburg we know from the works of Messrs. F. D. Pleske and E. A. Büchner, but I am convinced that it is there far less abundant than *M. arvensis*. I may add that I venture to consider the occurrence of *M. segetum* in the Taimyr peninsula (Boganida) recorded by Middendorff to be based partly on the yellow-billed and partly on *M. segetum serrirostris*, but in no sense on the typical bean-goose.

With this I conclude all the scanty information I have been able to gather with regard to the range of this species.

Nesting and Habits

According to Mr. G. F. Göbel, on Novaia Zemlia the bean-goose builds its nest on dry tussocks near lakes, but we are still without any further authentic information. The same

[1] When I was only just beginning this work.

ornithologist states that the eggs of the bean-goose have yellow blotches on a white ground, only a few of them being pure white. On the basis of 17 eggs from Chernaya Guba, Novaia Zemlia, examined by Mr. Göbel, we get the following table of their measurements and weight.

In these specimens are combined :—

Max. breadth	62 mm.	(= 2.24 in.),	with	86½ mm.	(= 3.40 in.)	length,	and	1680 cgrm.	weight.
Min.	„	53 „	(= 2.08 „),	„	82 „	(= 3.32 „)	„	„	1183 „	„
Max. length	88 „	(= 3.46 „),	„	55½ „	(= 2.18 „)	breadth,	„	1350 „	„
Min.	„	76 „	(= 2.99 „),	„	59 „	(= 2.38 „)	„	„	1140 „	„
Max. weight	1680 cgrm.,			„	62 „	(= 2.44 „)	„	„	86½ mm.	(= 3.40 in.)	length.
Min.	„	1183 „		„	53 „	(= 2.08 „)	„	„	82 „	(= 3.22 „)	„

The means of these figures are :—

17 eggs : mean breadth 56.2 mm. (= 2.21 in.) ; max. breadth 59 mm. (= 2.32 in.) ; min. breadth 53 mm. (= 2.08 in.).
17 „ „ length 83.7 „ (= 3.29 „) ; „ length 88 „ (= 3.46 „) ; „ length 76 „ (= 2.99 „).
12 „ „ weight 1380 cgrm. ; „ weight 1680 cgrm. ; „ weight 1183 cgrm.

When I wrote this, I was unaware that *M. neglectus* also breeds in Novaia Zemlia. I cannot therefore guarantee that some of the eggs in this list do not belong to the latter. I feel it the more incumbent on me to express that apprehension, lest Mr. Göbel might have drawn up the above table on the evidence of eggs of this "bean-goose," for which of course he would not be in the least to blame, as he did not himself collect the eggs. The fact that the eggs measured by Mr. Göbel are larger than those even of the yellow-billed goose, coupled with the fact that the bean-goose is less in size than the former, to some degree justifies my fears.

At present we do not know whether *M. segetum* has any peculiar habits as compared with the yellow-billed and Sushkin's goose ; but it is probable that no essential differences in this respect exist among the different bean-geese.

"NOVAIA ZEMLIA BEAN-GOOSE"

Melanonyx carneirostris, Buturlin

Anser segetum, Heuglin, Ornith, von Novaja Semlja und Waïgatch (Journ. f. Orn., Cab. 1872, pp. 121 and 122); Menzbier, Pt. Ross., i. p. 747 (1895); Buturlin, Tabl. dlya Opred. Plastinchatokl. ("Psov. i Ruzh. Okh.," 1900); *id.*, separ., p. 7; ? Dresser, Birds of Europe, vi. p. 369 (*partim* ?, Nov. Zeml.), 1878; ? Naumann, Vögel Deutschl., xi. p. 287 (1842) (*Rostro rubicundo pedibus flavis*); Frohawk, MS. *et figura capitis*, Feb. 1903.

Anser (*Melanonyx*) *carneirostris*, Buturlin, Dikie Gusi Ross. Imp. ("Psov. i Ruzh. Okh.," 1901); *id.*, separ., pp. 28-30 (1901).

? *Anser brachyrhynchus*, Semenov, "Prir. i Okhot.," July 1898, pp. 13-14.

? *Anser rufescens*, Smirnov, "Zur Ornis d. Barenzmeeres.," Ornith. Jahrb., xii. 1901, pt. 6, pp. 206-207; ? Palmén, Finl. Fogl., ii. p. 339 (= *segetum* ?)

Anser carneirostris, Semenov, "Rossiya," ii. p. 104 (1902).

Judging by the information to hand, the goose first described by von Heuglin from Novaia Zemlia, and subsequently called *Melanonyx carneirostris* by Buturlin, is distinguished from the typical bean-goose (*M. segetum*), to which a yellow-orange band on the bill is usually ascribed, merely by the fact that this band, instead of being yellow-orange, is dark flesh-colour, while the legs and feet are of the same yellow colour (of various tints) as in *Melanonyx segetum*.

Unfortunately, no ornithologist has of late years carefully examined and preserved specimens of *M. carneirostris*, although several undoubtedly have had them in their hands.

For example, Professor M. A. Menzbier writes quite definitely of them in his *Ptitsy Rossii*:[1] "Such geese have often been in my hands among ordinary bean-geese, to which I referred them."

Of a goose with a light flesh-coloured bill and yellow feet from the Ryazan Government, where it was shot from a flock simultaneously with the ordinary *M. segetum*, Mr. A. P. Semenov makes mention.

Personally I have not seen fresh-killed geese with such different colouring of bill and feet, although it is quite probable that I have had such in my hands among skins of bean-geese I have examined; but, as I have already more than once said in the present work, it is impossible to infer the colouring of the soft-parts of the living birds from such skins. I was extremely delighted, therefore, by a letter I received from Mr. Frohawk of February 28, 1903, containing not only a description but a coloured figure of the head of a goose which I cannot but consider to be the so-called Novaia Zemlia bean-goose, as it agreed with the characters given by von Heuglin.

This goose (a female) was killed in Holland on February 17, 1903, by Mr. Pike, who at once sent it to Mr. Frohawk, by whom straightway the bill was drawn, and careful measurements taken.

[1] Vol. i. p. 747.

The colouring of the band on the bill of this example is pure vermilion, attaining its greatest brightness on the culmen, while the legs and feet are described by Mr. Frohawk as apricot-yellow. Attached to the drawing is the statement that the number of teeth on each side of the upper mandible is 25, but that the hindmost one is very small.

In its structure the bill of this specimen agrees with those of typical bean-geese, and the nail of the upper mandible is contained exactly $3\frac{1}{2}$ times in the total length of the bill. Further details appear below.

Weight	7 lbs. 3 oz.
Expanse	4 feet $10\frac{1}{4}$ in.
Total length of bird	$30\frac{3}{4}$ in.
Length from apex of bill to base of neck	13 in.
Wings	$18\frac{1}{4}$ in.
Wings projected beyond tail	$\frac{1}{2}$ in.

First and third of primary wing-feathers of same length.

Mr. Frohawk writes further that this is undoubtedly a typical bean-goose (*A. segetum*) with abnormal colouring of the bill. In considering this bird a bean-goose my correspondent is certainly right; the figure of the head showing all the characteristics of the species in question. As to the reasons for considering it abnormal, we should bear in mind that very few of the observers who have had in their hands bean-geese immediately after death, have directed their attention to the tint of the colouring of the band. Geese with such colouring have been handled by competent observers, in many cases some time after death, when it may be admitted that the colouring would have already more or less changed. Further, it should be kept in view that on the whole, as already said, *M. segetum* is far less numerous than the yellow-billed goose, and old bean-geese, judging, at any rate, by their almost complete absence from even large collections, are very rare; this last circumstance being explained by the fact that old birds are generally obtained in much less numbers than the less wary individuals.

Moreover, I may once more remark that the number of teeth in the genus *Melanonyx* apparently increases with age, so that those rudiments of teeth which in young birds may easily escape attention, as years go on attain considerable development and become easily noticeable. At present I can only say that my examinations of dried skins have almost convinced me of the variability in the number of teeth in geese of the genus *Melanonyx* with age, although I may note that in two or three cases I have come across facts apparently contradictory to this hypothesis. In order to confirm or disprove the supposition that the number of teeth may increase within certain limits with years, investigations should be conducted with live birds kept in captivity, by counting the teeth every year in the same individuals; and the directors of zoological gardens might come to the assistance of science on this point.

From these and other considerations, and seeing the complete identity in all respects save the vermilion band on the bill of the goose represented in Mr. Frohawk's sketch with typical bean-geese, I cannot avoid expressing my conviction that in all fully adult or, at any rate, old bean-geese the bill is normally not yellow-orange but either vermilion-rose or flesh-colour of various tints.

At the same time, I may direct the attention of the reader to the fact that this

vermilion colour in the figure of the bill sent me by Mr. Frohawk has nothing in common with the pure rose or rose-flesh colouring of the band on the bills of *M. brachyrhynchus* or *M. neglectus*.

I may add, as the result of a verbal communication from the author, that the bean-goose recorded by Mr. A. P. Semenov in *Priroda Okhota* for 1898 from the Ryazan Government had a pale flesh-coloured band on the bill and yellow feet, so that in all probability it belonged to this same *M. carneirostris*, and not to *M. brachyrhynchus*, as Mr. Semenov at first supposed.

To my great regret, this example was not preserved. The fact, however, that the specimen (a very small one) was shot from a flock simultaneously with a typical bean-goose is, in my opinion, favourable to the supposition that between *M. carneirostris* and *M. segetum* no specific difference exists, but that we have to do either with a case of age, dimorphism, or a mere individual peculiarity.

This view is supported by the fact that a similar variation occurs in the East Siberian form of the bean-goose (*M. segetum serrirostris*), three examples of which, collected by Mr. Sokolnikov in the Anadyr region, were sent to me for examination by Professor Menzbier.

On the labels of these skins Mr. Sokolnikov has noted that the bands on the bills were of a dark flesh-colour, and therefore the specimens were inscribed "Novaia Zemlia goose." Further notes on these specimens appear later; but seeing that, with the exception of the colouring of the bill of the Novaia Zemlia bean-geese, I can find in von Heuglin's account no difference from the ordinary *M. segetum*, I consider it superfluous to quote the description given by this author, which would merely encumber a work already somewhat heavy reading.

Having expressed my conviction that *M. carneirostris* is apparently a mere synonym for the bean-goose, I may add that I am not entitled to assert that this opinion is incontrovertible. It may be—although I am personally disinclined to admit it—that further investigations will show that I am mistaken; but at present I have nothing definite in favour of the supposition that there exists a distinct species of Novaia Zemlia goose.

THE EASTERN BEAN-GOOSE

MELANONYX SEGETUM SERRIROSTRIS, SWINHOE

Plate 12

English—*Eastern Bean-Goose.*

Russian—*Gus pashenny* (Maak); ? *bolshoi gumennik* (Yakutsk, *teste* Maak, probably confounded with Ellon Middendorff's goose); ?*polevoi* or ?*chernevoi gus*[1] (acc. Yablonsky, for Barnaul, where, probably, *M. arvensis* and *M. segetum serrirostris* are confounded under these names); *gumennik dlinnoklyuvy* and *tolstoklyuvy* (Buturlin); *gumennik* and *diki gus* (of sportsmen).

German—*Sibirische Saat-Gans.*

Anser segetum, Middendorff (*partim*) (*nec* Gmelin), Sib. R., ii. p. 227 (1851); Schrenck, Reis. Amur-L., p. 463 (1860); Swinhoe, Ibis, 1860, p. 67—1861, p. 344—1862, p. 253; Radde, Reis. S.-O. Sib., ii. p. 356 (1863); Taczanowski, Faune Orn. Sib. or., p. 1095 (1893); David and Oust., Ois. Chine, p. 491 (1877); Dybowski and Taczanowski, Bull. Soc. Zool. France, 1884, p. 147.

Anser serrirostris (Gould, MS.), Salvadori, Cat. Birds Brit. Mus., xxvii. p. 101 (1895); Seebohm, Ibis, 1884, p. 269; Oates, Man. Game Birds of India, ii. p. 76; Hume and Marshall, Game Birds of India, iii. pp. 67–69 (1880); Buturlin, Diki Gusi Ross. Imp. (Psov. i Ruzh. Okh., 1901); *id.*, separ., p. 45 (1901).

Anser segetum, var. *serrirostris*, Swinhoe, Proc. Zool. Soc. London, 1871 (China); Dybowski, J. f. Orn., p. 108 (1873); Buturlin, Tabl. opr. Plastinchatokl. (Psov. i Ruzh. Okh., 1900); *id.*, sep., p. 8; Macpherson, History of Fowling, 1897, p. 228.

Anser segetum serrirostris, Stejneger, Bull. U.S. Nat. Mus., No. 29, p. 144 (1885); Seebohm, Hist. Brit. Birds, iii. p. 494 (1885); *id.*, Birds of Jap. Empire, ii. p. 236 (*partim*) (1890); Buturlin, Sinopt. Tabl. Okh. Pt. Ross. Imp., p. 44 (1901).

? *Anser segetum middendorffii* (Sev.), Nikolsky (*partim* ?), Sakhalin i yego F. Pozv., p. 224 (*an. mentalis*, Oates; *longit. ung. maxillae* = 22 mm. !), 1889.

ADULT BIRDS

I can discover absolutely no difference in the colouring of the plumage of the East Siberian variety as compared with the typical bean-goose; and only the greater size of the whole bird, and the longer and more massive bill, distinguish the former from the latter. Further, although I have not noticed any white feathering along the base of the upper mandible, on the very tip of the chin, or a little short of it, there occur in some examples separate white plumules forming an irregular spot.

A dark or light rufous tint on the head is frequently met with, as in *M. arvensis sibiricus*; but a yellowish or light bay tint, which is not rare in the latter, I have not once seen in the goose under description. Judging by the few specimens, which I consider females, these

[1] Chernevoi, from breeding in the "chern" or "taiga," according to Yablonsky.

yield to the males in size, and the bill in these does not attain the massiveness characteristic of old ganders. Unfortunately, I have to make all these statements from inadequate material, and it is quite probable that the variations in the colouring and dimensions of the goose are really much more considerable.

Young Male

A young male with culmen 59 mm. (=2.32 in.), and depth of lower mandible 10.5 mm. (=0.41 in.) in the thickest place (bill shut), from Mongolia (river Etyr), is distinguished in nowise as regards colouring from the adults, and is probably a two-year-old bird.

I know nothing of young birds in first plumage or of the young in down.

Dimensions of Adult Birds of Both Sexes

Total length	776–825 mm. (=30.50–32.40 in.).
Wing	425–450 mm. (=16.70–17.70 in.).
Culmen	62–72 mm. (=2.44–2.83 in.).
Greatest depth of lower mandible with shut bill	10–12 mm. (=0.39–0.47 in.).
Tarsus	73–85 mm. (=2.78–3.34 in.)
Length of median digit without claw	71–75 mm. (=2.79–2.95 in.).

Number of teeth on each side of upper mandible, 20–25.

I here give a table of bill-measurements in several specimens :—

Sex.	Culmen.	Visible depth of lower mandible with shut bill.	Number of teeth on side of upper mandible.	
♂	64 mm. (=2.51 in.)	10 mm. (=0.39 in.)	20	Barnaul, from Prof. N. F. Kashchenko.
♂	62 „ (=2.44 „)	11 „ (=0.43 „)	20	„
?	69 „ (=2.71 „)	12 „ (=0.47 „)	20	Sakhalin, Coll. of Zool. Mus., St. Petersburg.
?♀	68 „ (=2.67 „)	11.7 „ (=0.46 „)	20	Chukchiland, „ „
?♂	72 „ (=2.83 „)	12 „ (=0.47 „)	20	„
♂	71 „ (=2.79 „)	11.5 „ (=0.45 „)	20	Japan ? (or China ?).
♂	65 „ (=2.55 „)	11 „ (=0.43 „)	21	Yakutsk, Coll. of Prof. M. A. Menzbier.

The dimensions of this goose (first separated by Gould (MS.) under the name of *Anser serrirostris*, but described subsequently by Swinhoe) apparently show a considerable increase as we approach the East, this being particularly the case, as it seems to me, in regard to the massiveness of the bill.

In view of the fact that the chief character distinguishing this Oriental form of bean-goose from the Western type is the bill, I dwell in somewhat greater detail on the description of this part.

While the bill of adults of the typical *M. segetum* never apparently exceeds 61 mm. (=2.36 in.) in length, that of the Eastern form (*M. serrirostris*) varies in culmen-length between 62 and 72 mm. (=2.44—2.83 in.).

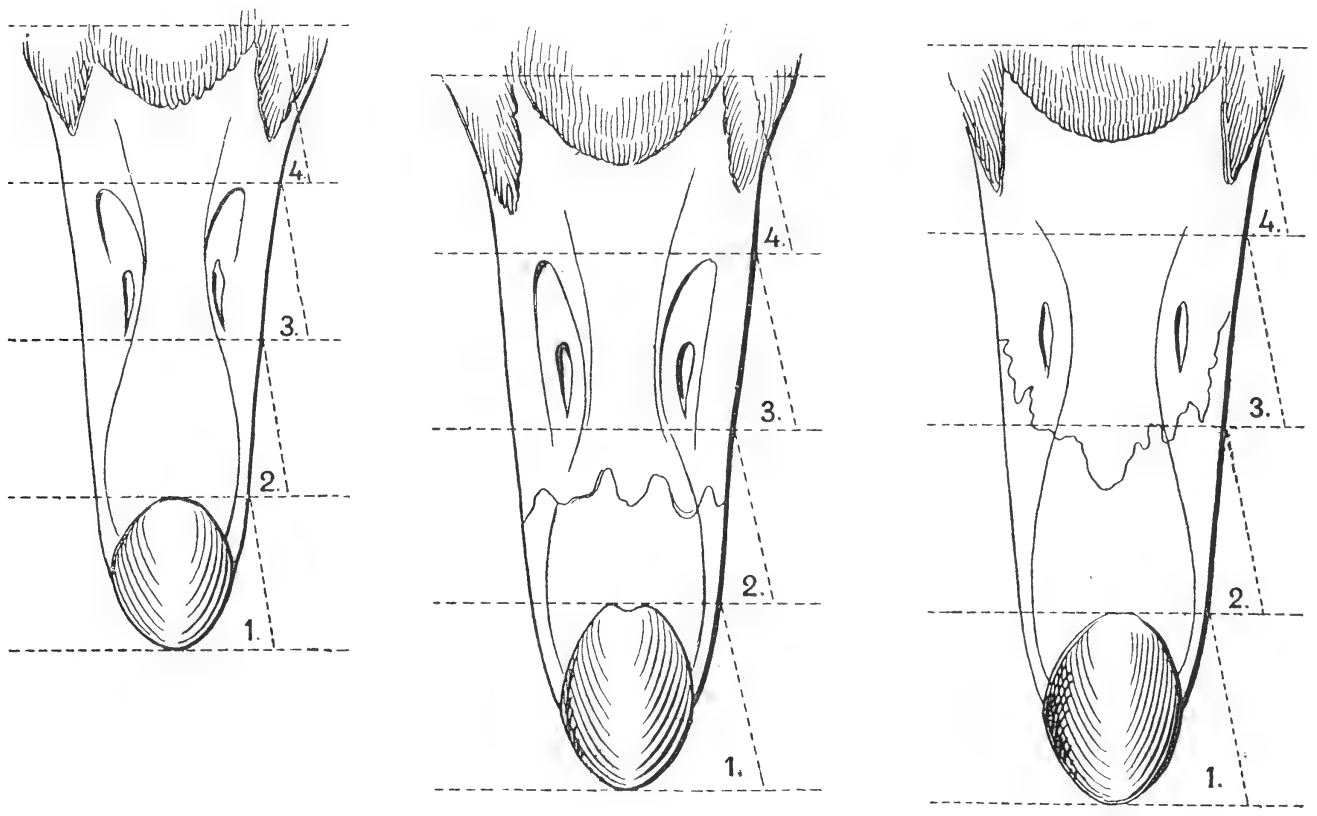
Still more striking than its length is the thickness, or massiveness, of the bill, which is shown in the size and strength of the nails on both mandibles, and in the depth, or thickness, of the lower one. Although this last character, first noted by Mr. Oates, undoubtedly much facilitates the discrimination of the different species and varieties of the genus *Melanonyx*, even on cursory inspection, yet this is only seen by comparing it with the

other dimensions and the structure of the bill, and it cannot in any wise be regarded as a decisive and important character. As we have already seen when describing the typical bean-goose, the bill, with a culmen-length never exceeding 62 mm. (=2.44 in.),[1] has a greatest depth of the visible part of the lower mandible (with shut bill) of from $7\frac{1}{2}$ to 9.2 mm. (=0.29—0.36 in.). The bill of the Siberian form (*M. segetum serrirostris*), on the other hand, varies in length between 62 and 72 mm. (=2.44—2.83 in.), and has a maximum depth of lower mandible, under like conditions, of from 10 to 12 mm. (=0.39—0.47 in.), but oftener between 11 and 12.

As in the typical *M. segetum*, so in the race now described, the number of teeth on each side of the upper mandible usually varies from 20 to 21; and I once thought that this was the limit, but, as we shall see at the end of this notice, this number is sometimes increased to 25, so that in this case also I am confirmed in my view that the number of teeth in this group of geese is not constant.

Although the arrangement of the black and light areas on the bill is absolutely the same as in the typical form, I have not seen in *M. segetum serrirostris* the colouring extending backwards beyond the anterior margins of the nasal depressions, which occasionally happens in the typical bean-goose. With the exception of this light ring, embracing both mandibles in the apical part, the whole bill is black.

Plate 23 shows clearly the difference in size and stoutness of the bills of both forms of this goose, while below are figured side by side the upper mandibles of both. This



M. segetum, ♂
Culmen $59\frac{1}{2}$ mm.
(Europe.)

M. segetum serrirostris, ♂
Culmen 69 mm.
(East Siberia.)

M. segetum mentalis (?!). Type.
Culmen 72 mm.
Japan (Brit. Mus.).

comparison is necessary, because *M. mentalis* has a bill closely resembling in structure those of the other two bean-geese; and in all probability that form will prove to be nothing more than a large type of *M. segetum serrirostris*, as is mentioned in the sequel.

[1] I have not myself seen an example with culmen exceeding 61 mm. (=2.40 in.); but as Dr. Madarasz speaks of one with 62 mm. (=2.44 in.), I think this size may have been the result of measuring the bill along the arc, and not the chord as I have always done.

Geographical Distribution

If it be assumed, as I hold to be the case, that all the statements in regard to the bean-goose of East Siberia made by Messrs. Middendorff, Schrenck, Maak, Radde, and Taczanowski refer to *M. segetum serrirostris*,[1] it may be safely said that the latter goose occurs throughout Siberia to the east of 80° W. long., breeding both in the whole tundra of the northern part of the country from the Yenisei to Chukchiland inclusive, and in the taiga considerably farther south than anywhere in the west, where *M. segetum* nests. We know, for instance, that it breeds both on the Stanovoi range and on the island of Shantar; and if it does not nest, but only halts, on passage in Sakhalin, this can only be in consequence of the absence of suitable spots on the latter island. On the western limit of its range, to the north of Barnaul, where probably (together with *M. arvensis*) it is known under the name of "chernevoi gus," it appears to descend much farther south than the western breeding-area of *M. segetum*.

To fix the southern boundary of the breeding-grounds in Siberia of *M. segetum serrirostris* is at present impossible, and doubtless some considerable time must elapse before this can be ascertained. If I consider that the form of *M. segetum* which authors speak of as the East Siberian bird belongs to *serrirostris*, and not to the typical race, I do so merely on the ground that I have not seen a single typical bean-goose from localities lying eastward of Lake Baikal, notwithstanding the considerable amount of material I have examined from those parts. If, nevertheless, it should turn out that this is a mere chance, and that typical bean-geese both breed and are met with in great numbers in East Siberia (as stated by many writers), it would then probably be necessary to recognise *M. serrirostris* as an independent species. To form any opinion based on our present imperfect information, without a single specimen to confirm it, would, however, scarcely be in accordance with scientific procedure. In winter *M. segetum serrirostris* descends into China, Korea, and Japan, and, according to the missionary Abbé Armand David, is in winter more numerous in China than all other geese taken together. On the return passage in spring it sometimes even alights in the city of Peking itself.

In view of the scantiness of our information regarding the Siberian bean-goose, the following notices from various writers which seem to refer to this bird may be quoted. Maak says: "On April 24 I saw the first pair on the Lena, 430 versts above the Yakutsk. Afterwards I saw large flocks on the Lunkha (60° N. lat.) during the whole of May, and on the Vilyui even on June 6; they were flying in a north-westerly direction. They never alighted on the Lunkha; but about the mouth of the Vilyui, from the latter days of April till May 10, they might be seen in thousands on the shoals. They often breed round lakes of the Vilyui basin, far removed from human habitation. Here moulting continued till July 25, on which day I no longer noticed any geese of this species on the wing.[2] While on the Khaingia (65° 30′ N. lat.) I often saw bean-geese that had only just finished moulting, circling and flying in all possible directions. They began to leave the Khaingia on August 19, flying S. and S.W.; the last and most numerous skeins of migrating birds of this species I saw on September 13 on the Eyakita (67° N. lat.).

[1] Middendorff's statement may partly refer to the yellow bill of *M. arvensis*, as I have already pointed out in the notice of that species.

[2] Maak calls it *A. segetum*.

"According to the observations of Pavlovsky, who saw the last birds of this species on September 25 on the Ygetta (64° N. lat.), their departure commenced on September 2, on the Markha, at the mouth of the Khaingia (65° N. lat.).

"Near the town of Nerchinsk, these geese were killed on May 1, in the valley of the Shilka, at the Shilka works; and I saw hundreds of skeins, during a slight shower, flying high or low over the river. The last flocks I saw at the Shilka works on May 17, when they were flying N. and N.N.W."

As to Middendorff's statement concerning *M. segetum* on the Taimyr peninsula, it is evident, as already said, that it must in part refer to the typical yellow-billed *M. arvensis*, and in part to *M. segetum serrirostris*. As the Taimyr peninsula is a vast tract, it is quite probable that in various parts of it there may breed the typical yellow-billed, Middendorff's goose, and the species here described; while in the more westerly portion of this peninsula it is possible (although not probable) that the typical bean-goose may occur. To clear this up will require time and careful determination, and until this is done there is no possibility of saying anything definite with regard to the geese of this great region.

Middendorff observes that *M. segetum* nests throughout the Taimyr tundras, and that it appeared soon after April 14 on the Boganida (70° N. lat.). On July 1 he found in 74° N. latitude a nest with four eggs partly incubated, which were subsequently eaten by a skua (*Lestris pomarina*). The nest, which consisted of a hollow in the top of a grassy tussock about two feet high, on the bank of the river itself, was lined with stems of last year's weeds, and a small quantity of down. On July 17 these geese on Taimyr began to moult, and as late as July 26 countless gaggles were seen in moult. By the end of July the majority had finished moulting, and on August 8 small groups of from three to seven birds were to be seen, which were called by the natives *detniki* (parents), consisting of birds of both sexes. About this time fully fledged geese were continually making for the sea in vast flocks.

Middendorff adds that these geese are also met with in the south-east, and that they were noticed for the first time at Anginsk on April 23. Somewhat later, large flocks appeared. The species breeds on the Stanovoi range, as also on the island of Shantar. On August 30 the first gaggles returned to the shore of the Okhotsk Sea, where they halted, and remained as late as September 19 in enormous flocks, which, far away from water, fed exclusively on bilberries.

After the present notice was finished, I received from Professor M. A. Menzbier, in January 1903, several goose-skins collected by Mr. Sokolnikov in the Anadyr district, three of which are very interesting and at first greatly puzzled me. Owing to the inscriptions on their labels, I did not at once recognise them as Siberian bean-geese. As a matter of fact, in the conformation of the bill and in all its dimensions, these three geese agree exactly with *M. segetum serrirostris*; whereas on the labels it is stated that the band on the bill is "dark flesh-colour," and the feet "orange." Moreover, as Mr. Sokolnikov marks these birds as from Novaia Zemlia, they seemed to correspond with what *M. carneirostris* of Buturlin ought to be, according to the description.

We have, however, already seen in the notice of that species that it was based on notes alone, and that, after careful consideration of the question, I was unable to recognise the specific distinctness of the "Novaia Zemlia bean-goose," and regarded it merely as a dimorphous form of *Melanonyx segetum*. Moreover, in addition to the aforesaid dark

flesh-colouring of the band on the bill, the number of teeth on each side of the upper mandible proved to exceed that in all the specimens of *M. segetum serrirostris* I had previously seen, in which they varied from 20 to 26.

Below is given a table of the chief characters of these three Anadyr geese, sufficient for comparison with the specimens of *M. segetum serrirostris* examined by myself.

From this my first idea was that these skins might belong to young individuals of *M. mentalis* of Oates,[1] a goose as yet but little known, and of which the type specimen in the British Museum has the whole chin white. This seemed the more probable from the fact that the number of teeth on the sides of the upper mandible of the Anadyr specimens, amounting in two cases to 25, was the same as in *M. mentalis*.

	Culmen.	Greatest thickness of lower mandible, with shut bill.	Number of teeth on sides of upper mandible.	Proportion of nail of upper mandible to culmen.	Wing.	Remarks.
	mm. in.	mm. in.			mm. in.	
Label of skin, No. 222. ♂ adult, but not old. May 29, 1902. Post Novomariinsky. Anadyr district.	70 = 2.75	11 = 0.43	22–23	3½	475 = 18.70	Band on bill regular, as in all *M. seg. serrirostris*, but of dark flesh-colour. Feet orange. Belly very white. No white feathering on chin. At base of bill, above and laterally, several light featherlets.
Label of skin, No. 249. ♂ adult, but not old. June 7, 1902. *Ibid.*	65 = 2.55	11 = 0.43	25–25	3½	somewhat shorter	Colour of band not stated, but as label is marked "Novaia Zemlia goose," it evidently was dark flesh-colour. On chin, large white patch. Feet orange.
Label, No. 219. ♀, not old. May 29, 1902. *Ibid.*	65 = 2.55	11 = 0.43	24–25	3½	somewhat shorter	Band on bill "dark flesh-colour"; almost whole of apical part of chin white. Feet orange.

Again, the dark flesh-colour of the band on the bills suggested the idea that this might be normal for the thick-billed goose (*M. mentalis*), which had been little studied in this respect, especially since in *M. segetum serrirostris* the bill is always described as yellow-orange, as indeed it is in the specimens in collections.

It is true, indeed, that in the three specimens of *M. mentalis* of which there is any description at all, there is not only a light band on the bill, but the light colour extends more or less irregularly back under the nostrils—a feature I have never noticed in *M. serrirostris*. This must accordingly be kept in view, as it suggests another conclusion which is referred to in the section on *M. mentalis*.

I repeat, then, that when all this information was in my hands, and I received from Mr. Frohawk a sketch of the bill of a red-rose-billed bean-goose killed in Holland, I thought that it would be impossible to solve the puzzle without new and abundant material; but, little by little, by thinking over the question day and night, the whole difficulty began to clear up.

Still earlier, when I received from Mr. Buturlin the Kolguev bean-geese with 25 teeth on each side of the upper mandible, I realised that in that species the number of teeth was not limited (as I formerly thought) to 21, but normally varied between 20 and 25.

Almost at the same time I received from Mr. Frohawk the information that in *M. brachyrhynchus* there sometimes occur 25 instead of the presumed 20–21 teeth; and

[1] See next section.

accordingly the number of teeth (25) in the bean-goose (with vermilion band) killed by Mr. Pike in Holland offered no obstacle to my assigning it to *M. segetum.*

All this taken together removed any doubt as to assigning the Anadyr specimens of bean-geese to the eastern *M. segetum serrirostris* ; and I arrived at the conviction that a slight dimorphism (limited in this case to the colouring of the band on the bill), analogous to that existing in the typical western *M. segetum*, occurs also in the eastern representative of the species, *M. segetum serrirostris*, which beyond considerably larger dimensions (especially of the bill) does not differ essentially from the former.

Even the white patches at the mental angle, met with in the Anadyr examples (in two of those brought by Sokolnikov), do not offer anything remarkable, since we have seen that such occur also in typical bean-geese, as shown in Mr. Buturlin's collection from Kolguev. The presence of white plumules, in greater or less number, in some specimens both of the Western and the Eastern Siberian bean-geese is indeed a very strong argument against the distinctness of yet another goose, namely, the thick-billed *Melanonyx mentalis* of Oates.

Indeed, once we are compelled to reject as worthless the character of "white chin" in the thick-billed goose, we are left only one specific feature—the unusual massiveness of the bill, which is mainly expressed by the great depth of the lower mandible.

Not having, however, at present, the right to absolutely reject the specific distinctness of the thick-billed goose, I pass on to record its alleged distinctive features and such facts as are known concerning its distribution.

THE THICK-BILLED GOOSE

MELANONYX MENTALIS, OATES

Plate 13

Beloborody and *Yaponsky gus* (Buturlin); *Klynvasty gus* (Alphéraky).

English—*The Thick-billed Goose.*

Anser mentalis, Oates, Man. Game Birds of India, ii. p. 77 (1899).
Anser (*Melanonyx*) *mentalis*, Buturlin, "Psovaya i Ruzh. Okh.," 1901 (Feb.-April); *id.*, Dikie Gusi Ross. Imp., separ., 1901.
Anser mentalis, Buturlin, Sinopt. tabl. Okhotn. Pt. Ross. Imp., p. 42 (1901); Bianchi, Yezhegodnik Zool. Muz. Imp. Ak. N., 1902, vol. vii., No. 3, p. xvi.
Anser segetum middendorffii, Stejneger, Bull. U.S. Nat. Mus., No. 29 (1885), p. 142, pl. vii. fig. 1 (rostrum); (?) Nikolsky, Sakhalin i yego fauna, p. 224 (1889).
Anser grandis, Przewalski (*nec* Pallas), Mongoliya i strana Tangutov, ii. p. 150 (1876).

ADULT BIRDS

Size very large. Plumage similar to that of *M. segetum serrirostris* or *M. arvensis*; the only specimen which I have been able to examine differing in nowise in colouring from the large yellow-billed species. No white margin round base of upper mandible, but in one example from Northern Manchuria (Inkow) a small light spot on very top of forehead.

The main difference between this goose and the other representatives of the genus *Melanonyx* consists in the extraordinary thickness or stoutness of the bill and in particular of the lower mandible, so clearly shown in the plate of bills.

In the original specimen which served Mr. Oates for the description of this goose the whole chin was pure white; but neither in the example in the Zoological Museum at St. Petersburg nor in a second from Bering Island, whose bill (under another name) is figured by Mr. Stejneger, does the chin show any white. On this point I may note once more that in two specimens of *Melanonyx segetum* brought in 1902 by Mr. Buturlin from Kolguev, the chin has a large white patch, which clearly indicates the instability of this character, and consequently its worthlessness for discriminating species.

Total length ♂ (Bering Island)	850 mm. (= 33.40 in.).
Wing	495–497½ mm. (= 19.40–19.50 in.).
Culmen	69½–75 mm. (= 2.73–2.95 in.).
Bill from gape	71–72 (= 2.79–2.83 in.).
Depth of bill at base	40–41½ mm. (= 1.57–1.63 in.).
Greatest depth of lower mandible, visible with shut bill	13–15½ mm. (= 0.51–0.61 in.).
Tarsus	96–100 mm. (= 3.77–3.93 in.).
Median digit with claw	93 mm. (= 3.66 in.) (in one example).
Its claw	15 mm. (= 59 in.).

Number of teeth on each side of upper mandible, 20–25 (from three examples).

To this description and dimensions I may add the following remarks: In the first place I direct attention to the fact that in the three specimens of this goose at present known to me, the yellow or orange colouring (or perhaps dark-flesh) forms not only a broad ring embracing both mandibles in the apical portion, but stretches more or less far backwards, under the nostrils, in irregular patches, in a manner I have not once observed in either *M. segetum serrirostris* or *M. arvensis sibiricus*.

Secondly, although the proportion of the nail as seen from above to the total length of the culmen in the specimen in the British Museum and in the male from Bering Island is the same as in *M. segetum serrirostris* (*i.e.* the nail is contained in the total length of the culmen $3\frac{1}{2}$ times), in the example from Northern Manchuria the nail is somewhat shorter and more rounded and occupies only a little less than one-fourth of the total length of the culmen, so that in form and relative size it somewhat approaches *M. arvensis sibiricus*.

Lastly, while the number of teeth in the example from Japan and in the Manchurian specimen is 25, Stejneger definitely states that in the male from Bering Island the number was 20, or that which is most commonly met with in *M. segetum serrirostris*.

On the strength of these three specimens it would seem, then, that the characters of the bill in *M. mentalis* are not constant.

At first these considerations led me to think that perhaps we have to do with hybrids between *M. segetum serrirostris* and *M. arvensis sibiricus*, although I thought it could not be admitted that the crossing of the former with the long-billed *M. arvensis sibiricus* would yield a breed with such a large and massive bill as is seen in the thick-billed goose.

Now, however, on the grounds stated at the end of the notice on the Siberian bean-goose, I have almost abandoned this hypothesis, and am rather inclined to see in these thick-billed geese only very old individuals of the Siberian bean-goose which have reached the limit of their growth. I even think that perhaps all such thick-billed geese will prove to be exceptionally old ganders of this species.

The question, then, as to whether *M. mentalis* constitutes an independent species or only a large form of the Siberian bean-goose still remains open.

Mr. Oates writes as follows on this goose: "On looking over the geese in the British Museum, I was struck by the large size of one of the specimens, its massive bill and white chin. It came from Yokohama, and was once in the Seebohm Collection. I can only regard this goose as a species which has not before been noticed, and I accordingly give it a distinguishing name. . . . There is nothing on the label of the specimen to show what the colour of the bill and legs was in life."

I may add that I have previously pointed out that one of the characters given by Mr. Oates, namely, the white chin, is not distinctive of this goose; so that beyond the massiveness of the bill and the great dimensions of the bird itself there are no sufficient characters to justify its right to specific independence.

Geographical Distribution

At present we know for certain three countries where the thick-billed goose has been found, namely, Japan, Bering Island (in the Komandor group), and Inkow in Northern Manchuria, where the example now preserved in the museum of the St. Petersburg Academy of Science was obtained on February 27, 1901.

Although I have already expressed my opinion that this type is probably not an independent species, but is based either on large individuals of Siberian bean-geese or perhaps on crosses of the latter with *M. arvensis sibiricus*, it is still possible that I am mistaken and that new observations and new material will lead to a different conclusion. Thus, for example, there is a passage in the writings of the late Colonel Przewalski which apparently refers to this goose.

This is what the Asiatic explorer writes: "This species (*Anser grandis*, Pallas[1]) was noticed by us in small numbers in the spring of 1871 on Dalai-nor, and in April of the next year on the flooded fields in the valley of the Khuan-khe. Although we did not succeed in getting a single specimen, yet from their larger size and particularly deep note, it was possible to distinguish even at a distance these geese from *Anser segetum*.

"On Lake Khanka *A. grandis* is very common during the spring migration, which begins about the middle of March and continues to the middle of April. These geese always keep in pairs or small flocks (3 to 7 individuals), generally not mixing with other species, than which they are far more wary.[2] Few pairs remain, however, to breed in the Khanka basin, the rest retiring at that season to the more remote lakes."

Przewalski evidently knew both the Siberian bean-goose (which he called *A. segetum*) and Middendorff's goose (*M. arvensis sibiricus*), and we gather from his words that the species he described was not the latter. On the other hand, he was also well acquainted with the "swan-goose," so that the passage quoted above evidently refers to some large *Melanonyx*, possibly *M. mentalis*. It is a pity that the famous traveller did not secure a specimen of this big bird.

This is all that I can glean with regard to *M. mentalis*. The figure was drawn by Mr. Frohawk from the specimen in the British Museum, which served Mr. Oates as the type of this at present doubtful species.

[1] Evidently not, as we now know that under this name Pallas could only mean domesticated swan-geese (*Cygnopsis cygnoides*).

[2] That the flocks are small and keep apart is in favour of the supposition that they consist of old males, as is a trait of many animals, for the old males in old age keep aloof from their juniors.

Genus *Eulabeia*, Reichenbach (1852)

ALONG each side of the dark neck runs a broad white streak. Bill slender, entirely light (yellow), with black nails. Upper nail included in total length of bill not less than four times. (Adult birds.)

THE BAR-HEADED GOOSE

EULABEIA INDICA, LATHAM

Plate 14

Indiisky gus; *gorny* and *indeisky gus* (Przewalski); *Turkestansky gus* (Buturlin); *Mongolsky gus* (in Minusinsk district, *teste* Dr. Sushkin, although it does not apparently here ascend to the north of the Mongolian frontier).

English—*Barred-headed* or *Bar-headed Goose*.

Anas indica, Latham, Indian Ornithol., p. 839 (1790).
Anser undulata, Bonnaterre, Encyclop. Méthod., i. p. 114 (1790).
Anser melanocephalus, Vieill. xxiii. p. 332 (1818).
Anser indica, Stephens, Gen. Zool., xii. 2. p. 36 (1824).
Anser indicus, Sykes, Proc. Zool. Soc. London, 1831, p. 125; Hume and Marshall, Game Birds of India, iii. p. 81, pl. 12 (1880); Severtsov, Ibis, 1883, p. 76; Sclater, Proc. Zool. Soc. London, 1886, p. 320; Pleske, Th., Rev. Turkest. Ornis., p. 54 (1888); Przewalski, Mong. strana Tang., ii. p. 151 (1876); *id.*, III. Putesh. Tsentr. Az., p. 398 (with sketch), (1883); *id.*, IV. Putesh. Tsentr. Az., p. 327 (1888); Buturlin, Opredel. Plastinchatokl. ("Psov. i Ruzh. Okhota," 1900); *id.*, separ., p. 7; *id.*, Dikie Gusi Ross. Imp. ("Psov. i Ruzh. Okhota," 1901); *id.*, separ., p. 21 (*Eulabeia*); *id.*, Sinoptich. tabl. Okh. Pt. Ross. Imp., p. 42 (1901); Alphéraky, Kuldzha i Tian-shan, pp. 145 and 165 (1901); Taczanowski, Faune Orn. Sib. Orient., p. 1087 (1893); Oates, Man. Game Birds of India, ii. p. 59 (1899); Pleske, Th., Orn. Ausb. Exp. Gebr. Grum-Grz., in Mél. Biol., xiii. pt. 2. p. 27 (1892); Grum-Grzymailo, Pat. Zapadn. Kitai, i. p. 520 (1896); Salvadori, Cat. Birds Brit. Mus., xxvii. p. 105 (1895); Blanford, Fauna Brit. India, Birds, iv. p. 419 (1898); Finn, How to Know the Ind. Ducks, Calcutta, 1901, p. 21.
Bernicla indica, Grey, Cat. Birds, iii. p. 608, no. 15 (1844).
Eulabeia indica, Reichenbach, Av. Syst. Nat., p. ix. (1852); Taczanowski, Bull. Soc. Zool., ii. p. 43 (Baikal) (1877).
Eulabeia indica, Bonaparte, Compt.-Rendus, xliii. p. 648 (1856).
Eulabeia indicus, Ball, Stray Feathers, 1874, p. 436.
Anser skorniakovi, Severtsov, Vertik. i Goriz. Raspr. Turk. Zh., p. 148, pl. 10, figs. 3, 4 (adult and young in down) (1873); *id.*, Cab., J. f. Orn., 1873, pp. 346, 377, 386; 1875, pp. 8, 100, 184.
Eulabia, Newton, Dict. of Birds, p. 374 (1894).

ADULT MALE

Head and a broad longitudinal streak on sides of neck, white; black bar traversing hind part of occiput, reaching with its extremities to eyes; another shorter transverse black bar

crosses nape. Anterior part of neck, from lower portion of white throat, brownish grey, this colour gradually becoming paler and changing into the grey of breast, the feathers of which show whitish edgings. Under-parts and lower tail-coverts white. Flanks pale brown, with subterminal portions of feathers light rufous, and their extreme tips whitish. Back of neck brown-grey, gradually becoming paler as it mingles with upper part of back. Sides of breast, middle of back, and shoulders grey; each feather, passing towards the extremity into brownish grey, with a whitish tip. Rump bluish grey; upper tail-coverts white (sometimes with greyish tint). Tail feathers grey, with white edgings, and broad white tips. Upper wing-coverts, under side of wing, and axillaries uniform light bluish grey. Outer primaries grey with blackish tips; inner primaries and secondaries wholly blackish, latter with narrow whitish edgings. Tertiaries greyish brown.

Adult Female

Generally similar in plumage to gander, but considerably inferior in size and weight.

Young Birds

Forehead, sides of head and neck, chin, throat, and top of neck anteriorly white; occiput, nape, and hind part of neck dark brown; lower part of fore-neck dark grey. Upper and under surfaces of body more uniform in colour than in adults, and almost without signs of transverse bars or of light tips to feathers.

Gosling (about three months)

According to Mr. Hume: "It differs from the adult altogether in the head and neck markings. The bill is, as in the adult, yellow, but with the nail deep brown; the legs and feet appear to have been a brownish orange; the forehead is brownish white, a little tinged with rusty; there is a dusky line through the lores to the eyes; the whole crown, occiput, and nape is a sooty or dusky black; below this the back of the neck is wood-brown, and the sides and front of the lower part of the neck are pale dusky greyish, mottled with whitish, this being the colour of the tips of the feathers; most of the feathers of the breast and abdomen and lower parts generally have a pale, rusty, or fulvous tinge towards the tips; the conspicuous dark banding of the flanks is almost entirely wanting, only one dark greyish brown feather on each side having as yet made its appearance.

"There is no trace either of the two distinct black head-bars or of the conspicuous white neck-streak, so that the head and neck look strangely unlike those of the adult.

"The tail is rather browner than in the old bird."

Young in Down

Pale yellowish; top of head and upper surface of body light brown.[1]

In regard to the dimensions and weight of the birds and the colouring of the soft-parts, and other details, I quote largely from Mr. Hume; the more readily since it is unlikely that anyone else has had the opportunity of examining so many specimens of this species,

[1] In the drawing of the young in down, given by Severtsov in his *Vertik. i Goriz. raspr. Turk. Zhiv.*, pl. 10, fig. 4, two black transverse bars are shown on the head as characteristic for adult birds, and in the text it is said (p. 148) that "in it the speckling of the head and neck is already marked," and yet in one bird "the feather shafts were hardly yet pushing through." How to harmonise this statement of Severtsov's with the above-quoted description of a three months' gosling by Mr. Hume, I am completely at a loss.

or has devoted so much care and observation to the investigation. "I have measured and weighed," he writes, "a very large series of this species. The males average appreciably larger than the females of the same age, but they take some years to attain their maximum dimensions and weight, and many females are, therefore, as large or larger than many males, and it seems therefore useless to give the dimensions of the two sexes separately. Apparent adults varied as follows :—

"Length	698–850 mm. (= 27.50–33.50 in.).
Expanse	1422–1676 mm. (= 56–66 in.).
Wing	406–482 mm. (= 16–19 in.).
Tail from vent	127–177 mm. (= 5–7 in.).
Tarsus	52–76 mm. (= 2.50–3.30 in.).
Culmen	48.2–58.5 mm. (= 1.90–2.40 in.) (my measurements).
Bill from gape	45–58.5 mm. (= 1.80–2.30 in.).
Greatest depth, lower mandible, shut bill	4 mm. (= 0.15 in.) (my measurement).

Number of teeth, each side, upper mandible, 26–27.
Weight, 4–6 lbs. 14 oz.

"I have weighed, I find, more than a hundred; but I have never obtained one weighing quite 7 lbs., yet Jerdon gives the weight as 7 lbs. to 8 lbs. Only two of my specimens exceeded 6 lbs. 8 oz. The great majority are less than 6 lbs.

"The legs and feet are bright orange, sometimes paler, occasionally only yellow; claws horny black; the irides deep brown; the bill orangey-yellow to orange, rarely only pale lemon-yellow, often paler or greenish towards the nostrils; the nail black or blackish.

"There is a prominent tubercle nearly half an inch long in old males, just below the carpal joint, varying in dimensions according to sex and age, but always more prominent than in the grey-lag and other geese already mentioned."

I have examined the bills of several Central Asian specimens and convinced myself:

Firstly, that the length of the nail of the upper mandible is contained more than 4 times in the total length of the culmen, seen from above;

Secondly, that the depth of the deepest part of the lower mandible with shut bill was about 4 mm. (=0.15 in.); and,

Thirdly, that the number of teeth on each side of the upper mandible, judging from the shut bill, was 26-27.

Geographical Distribution

Central Asia in summer and the whole of India in the winter—this is, in broad outline, the range of this species, which is evidently not extensive.

If we examine in greatest detail the limits within which the bar-headed goose has hitherto been found, by drawing a straight line from Lake Baikal to the eastern angle of Koko-Nor and thence continuing it along the eastern portion of Assam and Burma to the Indian Ocean, we shall obtain the approximate boundary, to the east of which this species has not hitherto been observed. It seems, however, very probable that this goose will yet be found wintering in the southern part of this area, namely, in Northern Siam, although there are at present no direct indications of such occurrence.

The western limit of the range passes over the mountains of the eastern part of Russian Turkestan, the Pamirs, and the western edge of India, reaching in places westward (exceptionally ?) to the middle course of the Amu Darya near the city of Karki. It is more than likely that this goose occurs on the Pamirs in far greater numbers than is commonly supposed.

Although it is at present impossible to determine where the northern boundary of its range runs, yet we know that this goose breeds in great numbers on the Thian-shan alpine lakes (*saz*), and probably still farther north than the Thian-shan proper, namely, over the whole of the Ala-tau. I make this suggestion on the ground that I myself had the opportunity of observing in August on the Little Yuldus, in the Thian-shan, a multitude of migratory flocks of bar-headed geese flying extremely high over the mountain masses of the latter, from north to south ;[1] and whence could these flocks be flying, if not from the Ala-tau range? We cannot yet ascertain where lies the northern limit of the breeding grounds of this species farther eastward.

Here it may be mentioned that Dr. Sushkin, in his journey to the Minusinsk district in the summer of 1902, made the following notes, which I extract in full from a letter of the eminent ornithologist: "*Anser indicus* does not occur at all in the locality I have visited, but it appears in vast numbers on crossing the Tannu-Ola range into Mongolia proper from the land of Uryankhai.

" This is unanimously asserted by both Soyots and Russian traders. They call this species the Mongolian goose, and describe it as smaller than the domesticated bird, with a very light grey colour like the wing of a bustard or sea-gull, a yellow bill, and black streaks on the head, like a hood."

On the whole, it is quite possible that farther eastwards the northern limit of the breeding grounds ascends somewhat, since flocks of these geese were met with by Dybowski and Godlewski on Koso-gol, and by the latter in July 1876, a gander (from a pair) was killed on Lake Baikal. The chief centres of the breeding range of this species are, however, undoubtedly the lakes of the Tibetan plateau, and in the south Kashmir, Ladak, and in all probability Sikhim.

So far as is yet known, this goose breeds nowhere beyond the mountain zone. It winters throughout India, mainly in the northern provinces, in countless numbers; in the south of India, on the other hand, it is met with in far smaller numbers, and in Ceylon it is unknown. Although it may occur in winter in South Afghanistan and Baluchistan, I have found no record to that effect. It is very probable that it dwells here and there permanently in the Himalaya, but it has nowhere been found nesting below an elevation of 6000 feet; and for this reason it may bear the name of "mountain goose" bestowed by Przewalski.

Migrating to its breeding grounds in spring it occurs, for example, but rarely on Lob-Nor, according to that explorer, but in autumn, if we believe native report, it visits that lake in great numbers. Hence it is clear that it has migration routes which are by no means constant in spring and autumn—a feature common to several other species of geese, as I have noted, for example, in the case of the greater and lesser white-fronted species.

The details of the distribution of this goose, within the above limits, cannot yet be worked out; and only in regard to its winter haunts do we possess fuller data than for several other species of geese, as is noted below in the extracts from the works of Messrs. Hume and Oates.

Przewalski gives us the following details on the habits and behaviour of the "mountain goose": "This species," he writes, "nests exclusively on mountain swamps and along streams or meres on high plateaux, as on Koko-Nor, where it arrives in early spring—about the end of February or beginning of March. From the time of their arrival these geese associate in flocks of from five to twenty individuals, and soon proceed to build their nests

[1] Against a strong south-east wind.

in the marshes, probably for lack of cliffs in the neighbourhood, where these geese usually nest when in the mountains.

"In the pairing season the male frequently pursues the female on the wing, turning somersaults in the air like a raven.

"The mountain-goose is fairly tame, and remarkably inquisitive, especially if not in flocks; and when a pair are pursued they will fly not unfrequently towards the fowler, squatting in the grass or lying flat on the ground."

In another passage the same writer observes, as if in continuation of the last phrase: "If one of the pair be killed, the survivor (especially the male) flies with a cry round its dead mate, and usually itself gets shot.

"Having noticed a pair flying in the distance, I lay on the ground and began to gently wave my cap; on seeing this, the geese flying past swept round in my direction, and often flew right over my head.

"The cry of this species is a somewhat whimpering but rather loud note. The goslings, of which there are from five to eight in a brood, keep with their parents about the streams or lakes by which they were hatched. The old birds at this time begin to moult, and by the beginning of July, when the young birds have almost grown up, are so devoid of feathers that they are quite unable to fly.[1] The mountain-geese, at other seasons rather trustful, then become very wary.

"On the large lakes, such as Koko-Nor, where there are very many of these geese, scores of broods combine for mutual defence.

"Usually a flock will wander along the shores of a lake or on the neighbouring marshes, cropping the grass; but on perceiving a fowler, even half a mile off, all the geese rush headlong into the lake and swim far away. They run very fast, probably faster than a man."

Severtsov, who described it under the name of *Anser skorniakovi*, gives us very little information with regard to this species, although we learn from him that it was first discovered on Chatyr-kul and Son-kul.

Godlewski found it on the southern part of Lake Baikal, and he and Dybowski noticed it in flocks on Kosogol, where it breeds in small numbers.

Mr. Hume observed this goose in great flocks in India; and Mr. Oates also furnishes us with some valuable notes respecting this species, the substance of which is quoted below. The geographical distribution of this species in India is indeed well described by the latter author, who gives a concise and clear picture of the general disposition of its winter haunts.

"The bar-headed goose," he writes, "visits the plains of India in the cold weather, arriving in October and leaving in March, or even April, but these dates vary, of course, according to locality and climate. This species may be considered a common bird in Northern India from the Punjab to Assam. On the western side it appears to occur as far south as Sind, and rarely in the Bombay Presidency; it is common in the Central Provinces; and on the east coast it extends down to the Chilka Lake. In Southern India this goose is by no means so rare as it is generally deemed. It has been found in large numbers in Mysore. . . . Jerdon, on one occasion, observed this species in the extreme south of India. It is not known in Ceylon. South of Assam, this goose has been observed . . . in Sylhet and . . . in Manipur. It occurs . . . on the Chindwin River, and . . . is common enough in the Irrawaddy River and adjacent tanks and backwaters, down to Myingyan at the least."

[1] A common feature of all geese, swans, and ducks, as the flight-feathers always fall out simultaneously.

After a few more details, Mr. Oates concludes that the "bulk of the Indian visitors probably come to us from Central Asia."

This is what Mr. Hume has to say: "Their habits are similar to those of the grey-lags. Where frequently disturbed, they feed inland only at night; where rarely molested, they will be found feeding up to eight or nine in the morning, and again long before sunset. The day, or at all events the warmer hours of this, they pass by the water's side. They feed in fields, preferentially in those in the immediate neighbourhood of the larger rivers, browsing on the young wheat or waddling awkwardly amongst the heavy clods, amidst which the gram grows, to devour the young shoots, or later the ripening pods of this vetch. All vetches, lentils, grain, tender grasses, and herbs seem equally to suit their taste, and so long as these are available they eat nothing else, and by the end of December (thin and poor as they usually are when they first arrive) they are generally in fine condition. . . .

"The note of the bar-headed goose is quite distinct from that of the grey-lag. It is sharper, harder, less sonorous, and more strident. I hardly know how to put it in words, but it is so distinct that you can never doubt, even when the flock is passing overhead high in air, during the night, to which species it belongs. The two species never mingle companies; you may see half a dozen of the one along with a flock of the other, but whether feeding, sleeping, swimming, or flying, the parties keep a little apart."

Like the grey-lag, the Indian goose rarely settles on water, unless alarmed. According to Mr. Damant, in Manipur this goose has the following habit: "I have often watched them," he writes, "returning from their feeding-grounds to the lake where they intend to pass the day; their cry is heard before they can themselves be seen; they then appear flying in the form of a wedge, each bird keeping its place with perfect regularity; when they reach the lake they circle round once or twice, and, finally, before settling, each bird tumbles over in the air two or three times precisely like a tumbler pigeon. After they have once settled they preserve no regular formation."

Mr. Hume also cites the interesting observations of Colonel Tickell: "They are first noticed in Bengal about the middle of October, flying, like the crane, in single diagonal (or echelon) lines, or in two lines, forming an acute angle. At such times their mingled voices sound like ill-blown clarionets, each emitting a single note. As they wend along in the air the leading bird is seen every four or five minutes to drop to the rear, its place being immediately filled by the next one, which is in turn relieved by the next, and so on. This movement is to be seen amongst cranes, pelicans, spoonbills, swans, and other birds which perform long migratory voyages; from which it would seem that the leading bird meets with greater resistance from the air than do the succeeding files, and thus requires to be relieved after a certain time from its post.

"When about to settle, the line breaks up, and the birds, mingling together, sweep round in circles, approaching nearer and nearer to the earth, till, with a great flapping of wings, they settle."

Very little is known of the nidification of this species. It is asserted that on the lakes of Ladak and Tibet these geese breed indifferently in fresh and salt waters; but I find this difficult to believe, as I know that even purely marine ducks and geese (for example, eiders and brent) invariably breed near fresh water, and could hardly do without it in rearing their young. It is stated that they select by preference small eyots on lakes; according to others, as we saw from Przewalski, they nest on cliffs. Probably both modes occur, according to circumstances and the convenience afforded by different spots.

The nest is described as a shallow depression in the ground, lined first with the stalks of soft plants and above with down and feathers, so that in this respect it accords with the descriptions of nests of other members of the group.

The eggs, 4 to 6 in a clutch, are nearly elliptical in shape; and the shell is somewhat rough, white, and without any gloss.

Mr. Göbel has drawn up for me the following table of measurements of the eggs of Turkestan specimens of this species:—

Max. breadth 58.5 mm. (= 2.30 in.), with 78 mm. length (= 3.07 in.), and 1422 cgrm. weight.
Min. „ 56.5 „ (= 2.22 „), „ 81.5 „ „ (= 3.20 „), „ 1422 „ „
Max. length 82.5 „ (= 3.24 „), „ 58 „ breadth (= 2.28 „), „ 1392 „ „
Min. „ 78 „ (= 3.07 „), „ 58.5 „ „ (= 2.30 „), „ 1422 „ „
Max. weight 1422 cgrm., with 56.5 mm. breadth (= 2.22 in.), and 81.5 mm. length (= 3.20 in.).
Max. „ 1422 „ „ 58.5 „ „ (= 2.30 „), „ 78 „ „ (= 3.07 „).
Min. „ 1392 „ „ 58 „ „ (= 2.28 „), „ 82.5 „ „ (= 3.24 „).

Or

Mean breadth 57.5 mm. (= 2.26 in.); max. breadth 58.5 mm. (= 2.30 in.); and min. breadth 56.5 mm. (= 2.22 in.).
„ length 80.6 „ (= 3.17 „); „ length 82.5 „ (= 3.24 „); „ „ length 78 „ (= 3.07 „).
„ weight 1380 cgrm.; „ weight 1680 cgrm.; „ „ weight 1183 cgrm.

According to other information, the eggs attain a length of 83.8 mm. (= 3.30 in.), and, probably, we are still far from knowing their extreme variations in these respects.

Genus *Rufibrenta*, Bonaparte (1856)

Distinguished from other genera of geese with black feet by the circumstance that the whole chin is feathered, or, at least, the feathering of the chin falls short of the posterior margin of the nail of the lower mandible by only 1½–2 mm. (=0.05–0.07 in.). The bill is distinguished by a very strongly convex, rounded nail on the upper mandible, and by the fact that the nasal depressions are either in complete contact with the feathering of the lores, or approach the latter very closely.

The teeth on each side of the upper mandible do not exceed 16[1] in number, and with shut bill are not visible externally, since they do not project with their tips beyond the tomia. The plumage is mottled, comprising the colours black, white, and rufous, and across the wing run two transverse white bars. The tail-coverts do not reach the tips of the tail-feathers, of which there are 16.

THE RED-BREASTED GOOSE

Rufibrenta ruficollis, Pallas

Plate 15

English—*Red-breasted Goose.*

Russian—*Krasnozobaya kazarka* (more a book-name); *krasnozobaya kazará* (Bogdanov); *ryzhesheek*, *ryzhesheyaya kazarka*, and *tsvetnaya kazarka* (all three names on the Sarpa, acc. Artsybashev); *chubaraya kazarka* (Ural); *krasnozoby nemók* and *nimòk*; *piskunets* (Turukhansk, acc. Middendorff); *chukunok* (perhaps *chugunok* ?, at Tolsty Nos[2]); *ménshaya kazarka* (Lepekhin); *morskaya kazarka* (Obi); ? *turpan* (Obi, *teste* Finsch; hardly correct); *shmakovaya utka* (Vavilov[3]).

Ostyak—*Chakvoi*, *chagvoi*, and *chogvoi* (Obi); also ? *Lak* (*teste* Finsch).

Kalmyk—*Sunksúr.*

Samoyed—*Chagú*; *Seoníya* (Boganida, Middendorff).

Kirgiz—*Kekchentai*; *Kara-kaz* (Zarudny).

Yakut—*Kazarka* (Boganida).

German—*Meppelgans*; *Rothalsgans*; *Rothalsmeergans*; *Spiegelgans*; *Mopsgans.*

French—*Bernache à cou roux.*

[1] In the brent goose (*Branta bernicla*) the number of teeth on each side of the upper mandible varies from 28 to 30, so far as I can judge from the material examined.

[2] Schmidt, *Mém. Ac. I. Sc. St.-Pét.*, 7th ser., vol. xviii. No. 1, p. 43 (1872).

[3] *Okhota v Rossii*, pt. iv. p. 44. *Note.*—Confused with *Netta rufina* ?

Anser ruficollis, Pallas, Spicil. Zool., iv. part 6, p. 21 (1769); *id.*, "Voyages," iv. pp. 23, 51, and 672 (*ruficollis et pulchricollis*); *id.*, Zoogr. Ross.-As., ii. p. 231 (*ruficollis*) (1811); Mén., Cat. Rais., p. 56 (1832); Eversmann, Or. Kr., iii. p. 557; Kessler, Russk. Orn., p. 369; Naumann, Vög. Deutschl. xi. p. 408, pl. 293 (1842); Middendorff, Reis. Sib., ii. 2, p. 229, pl. xx. fig. 3 (ovum); Severtsov, Gorizont. i Vertik. Raspr. Turk. Zh., p. 70 (1873); Menzbier, Pt. Ross., i. p. 730 (1895); *id.*, Okhotn. i Prom. Pt. Ross. i Kavk., ii. p. 463, pl. 132 (*juv.* ?) (1902); Kholodk. i Sil., Pt. Yevr., p. 524 (1900); Zhitnikov, M., Orn. nabl. na Atreke ("Psov. i Ruzh. Okh.," 1900) (winter 1898 and spring 1899); Buturlin, Dikie Gusi Ross. Imp. ("Psov. i Ruzh. Okhota," 1901); *id.*, separ., p. 6 (1901, Tula); Artsybashev, Bull. Soc. Mosc., 1859, iii. p. 100; Yakovlev, Bull. Soc. Mosc., 1872, p. 356; Saban., Ukaz. Kn. St. Okh. Zool. Sod., pp. 455-458 (1883); Sushkin, Pt. Uf. gub., p. 68 (1897); Deryugin, Trudy Imp. Spb. Obshch. Yest., xxix. pt. 2 (1898); Yablonsky, Okhota v Minus. uyezde, Yenis. gub. ("Prir. i Okhota," 1891, vii. p. 58).

Anas torquata, Gmelin, Reis. Russl., ii. p. 179, pl. 14 (1774).

Anas pulchricollis, Georgi, Reis. Russ. R., p. 167 (1775).

Anas ruficollis, Latham, Gen. Syn., Suppl. i. p. 297 (1790).

Anser torquatus, Bonnaterre (*nec* Frisch), Encyclop. Méthod., i. p. 122 (1790).

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Adult Male

Forehead, occiput, nape, and hind part of neck shiny black; from occiput descends a similar black streak past eyes, joining the black of the chin and throat. Between sides of bill and eye a large round white patch, sharply cut off by above-mentioned black areas; on aural region a large rufous (cinnamon) somewhat square patch, bordered by a white streak, which descends from posterior lower angle of rufous patch along sides of neck, separating black of back of neck from rufous (cinnamon) of anterior part of neck and whole of breast. Here the bright rufous colouring is limited by a narrow white transverse bar, beginning on upper part of back. A black edging, more or less clearly defined, lies between this white band and rufous colouring of breast, attaining its greatest breadth at sides of latter near to back.

Back, rump, tail, and upper part of belly black; lower part of belly, sides of vent, and upper and under tail-coverts pure white. Flanks white with black transverse crescentic bars, due to black tips of feathers. Tail (16 feathers) flat, and rounded terminally. Wings brown-black, lesser coverts with lighter edges; median and greater wing-coverts with almost perfectly white edgings, forming two white slightly oblique bars across wing. Lower wing-coverts shiny black; axillaries black. All the flight-feathers brown-black. Shafts of primaries white only in basal third.

Bill, legs, feet, and unfeathered part of eyelids black. Iris dark chestnut or hazel.

According to the statements of some authors, there are sometimes, but apparently by no means always, a few white feathers on the forehead of adult males at the base of the bill, but I have not seen these in any skin I have examined. As to the feathering of the chin, in the majority of cases this is not wholly black, but has a sprinkling of white plumules, giving the chin a mottled appearance.

Adult Female

In outward appearance resembles adult male, but generally inferior in size. Among other features, the bill, so far as I could ascertain (from inadequate material), does not exceed 26 mm. (= 1.02 in.) in culmen-length. There is also, seemingly, no difference in the brightness of the colouring. It may be surmised that sometimes immature males have been mistaken for females.

Dimensions of Adult Birds of Both Sexes

Total length	540–560 mm. (= 21.2–22 in.).
Wing	350–360 mm. (= 13.7–14.1 in.).
Tail	153–154 mm. (= 5.90–6 in.).
Culmen	25–27 mm. (= 1–1.10 in.).
Bill from gape	27–28 mm. (= 1.06–1.10 in.).
Depth of bill at base of both mandibles	19 mm. (= 0.74 in.).
Tarsus	51–52 mm. (= 2–2.04 in.).

Number of teeth on each side of upper mandible, 16.

Young Birds (in Second Year)[1]

Shiny black of plumage replaced by brown; instead of a rufous patch in aural region, a similar grey-brown one, with more or less admixture of rufous plumules, the whole patch being of indefinite outline, mingling with the surrounding whitish (not white) streak. As regards the rufous colouring of the anterior part of neck and upper breast, it can only be said that it is lighter (rufous buff) than in adult birds. White transverse bar, bordering inferiorly the rufous of upper breast, less definite, and no black margin between this and the rufous, or only in the shape of a few separate black-brown plumules.

Tail-feathers with very narrow white or whitish tips. Under side of wings and axillaries grey-brown.

Feathering on chin with a large admixture of white featherlets, giving it a finely mottled appearance.

Tips of greater wing-coverts light buff; consequently both transverse bars across the wing are of this colour and not white.

Comparing the present description with the figure of a goose of this species in Professor Menzbier's *Okhotnichyi i Promyslovyya Ptitsy Yevropeiskoi Rossii i Kavkaza* by Mr. Thorburn, it is clear that the latter is taken from a young (adult) bird.

Of the young in down I have no information.

Geographical Distribution

The range of the red-breasted goose has been worked out in great detail by Professor Menzbier in his *Ptitsy Rossii*, and our knowledge has hardly been increased since the appearance of that excellent work.

[1] I do not know how many years this species takes to attain full dress; it is difficult to determine this from the plumage of two- and three-year-old birds, but nevertheless I think, for various reasons, that the description here given applies to two-year-olds.

According to that author, the species nests throughout the tundra of Western Siberia, from the lower Obi to the lower course of the Yenisei, at a comparatively small distance from the shore.

Professor Middendorff has furnished notes on the distribution of this goose on the Boganida and Pyasina, and Mr. Seebohm in the Yenisei district. Professor Menzbier holds it to be clearly established that this goose does not breed to the westward of the Ural range, or to the eastward of the north-eastern cape of the Taimyr peninsula; but if the data collected by Mr. Pearson in the summer of 1895 (see *Ibis*, 1896, p. 210) as to its breeding in Lapland on Lake Ukanskoe be confirmed, the limit of the range of this species will be extended considerably to the west of the line accepted by the author of *Ptitsy Rossii*.[1]

With this more westerly boundary of its habitat the frequent appearance of the red-breasted goose in Western Europe would be far more intelligible, but, unfortunately, nothing more can be said on the subject until there is actual confirmation of the data collected by Mr. Pearson. Professor Menzbier has explained very clearly the migration routes of these geese, both in spring and in autumn, how they descend by the rivers Obi, Irtysh, and Ural to winter in the southern part of the Caspian, where those flocks assemble which, not taking this line, travel through the Kirgiz steppes, halting from time to time on rivers and lakes, as also do those which travel direct from the Tobol through the Kirgiz steppes to the lower reaches of the Syr-Darya.

Of the vast numbers of red-breasted geese wintering in the Mugan steppe, Dr. Walter writes as follows: "In 1886, at the end of December, I met this beautiful kazarka in the Mugan, in the more northerly, less populous part between Karagalinsk and Salian, in colossal flocks at the lake-like broads of the lower Kura, together with flocks of 'ogars' (*Casarca casarca*), between December 21 and January 2, 1887. The geese at dusk visited the few winter crops of this scantily inhabited steppe. On the approach of night they flew in thousands from the fields over my cart. On January 17 I saw several small gaggles flying low from place to place, and seeking in broad daylight spots free from snow."

That the red-breasted species winters also somewhat to the east of the Caspian, in parts of Persia, appears from a most interesting article full of information by Mr. Zhitnikov, "Ornitologicheskiya nablyudeniya na r. Atreke," in the *Psovaya i Ruzheinaya Okhota* for 1900, to which we shall refer again more than once.

"On the return migration, that is in spring, a host of red-breasted geese, having ascended northwards to the mouth of the Volga"—writes Professor Menzbier—"partly continues its course by the regular route (*i.e.* to the mouth of the Ural) towards Kalmykov, Orsk, Tobol, and so on, but in part turns aside to the Volga and ascends by its valley to Sarepta, halting for a short time on the Sarpa, whence it travels along the river Ural to Uralsk."

As to this bird's straying to Archangel and Finland, if only the statement of its breeding in Lapland prove to be true, we shall obtain another explanation than the one offered by Professor Menzbier's hypothesis, namely, that such cases are due to birds which have lost their way. The visits of this species to the regions of the Kama, the middle Volga, Oka, Poland, and the Novorossiisk district, are probably far more frequent than is supposed, and I think it very possible that its appearance in South Russia is even quite normal. Thus, for example, beyond any doubt (at any rate in my mind) these geese pass in autumn near

[1] According to a Samoyed, who has long resided on Matochkin Shar, a "mottled goose" is occasionally met with there, which Mr. Buturlin surmises in his communication to me on the subject may be the red-breasted goose.

Taganrog, together with countless flocks of the lesser white-fronted species. Their numbers may perhaps be comparatively small, but I should not be surprised if time should prove that they winter in the southern part of the Black Sea, a region zoologically almost entirely unexplored. Professor Menzbier defines the eastern limit of the migrations of this species as the neighbourhood of Irkutsk.

Although there are no positive data in regard to India, we yet have Blyth's statements, which permit the belief that this goose has occurred in that country, to which it may turn out that it is a regular winter visitor. It is known, for instance, that of late years there have been observed in India, and in some cases in considerable numbers, species formerly no one expected to find there, such as *Erismatura leucocephala*, *Nyroca baeri*, *Anser finmarchicus*, and *Anas zonorhyncha*, so that there is nothing improbable in the occurrence of the present bird.

The rarity of the red-breasted goose on migration in Turkestan has yet to be verified. This species has also been recorded from North-west Africa, Italy (Florence, Mantua), France (Seine Inférieure), Holland (where, among other cases, a red-breasted goose was once killed from a flock of barnacle geese, together with twenty-three of the latter), Galicia, Hungary, various parts of Germany, etc. Mr. H. Saunders records sixteen instances of this goose being killed in Great Britain,[1] the last specimen being shot in Essex from a flock of brent in January 1871, and its skin subsequently sold by auction for thirty guineas.

That the extent of the winter haunts of this goose was formerly greater than at present is evident from the fact that coloured representations of the species have been preserved to this day in the tombs and temples of Ancient Egypt, while it is now never met with on the Nile. It is not yet clear whether it occurs in winter in Spain, although it can hardly be doubted that it sometimes finds its way to that country.

Although red-breasted geese arrive late at their breeding-grounds, not before the end of May or even the beginning of June, and at once proceed to build their nests, the movement northwards from their winter haunts begins very early. Thus, according to Mr. Zhitnikov's observations, the red-breasted geese wintering on the Gyurgen disappeared between January 18 and 23, and on January 22 reappeared on a lake in the middle course of the Atrek, whence about February 7 they were already winging their way farther north.

From the South-western Caspian they start in the same direction towards the end of February, and by the beginning of March appear near Astrakhan; they then gradually move northwards, halting in the Kirgiz steppes till April, and later on leisurely continue their journey north, reaching their native tundra either by the end of May or in the beginning of June. Near Orenburg Mr. Zarudny came across them in small skeins of from 3 to 15 birds during the whole of April.

Professor Middendorff writes as follows of this species: "I have not found it on the Taimyr, but they say it usually nests and moults at the mouth of the Pyasina.

"This goose frequently breeds on the Boganida, where, on June 25, the eggs were slightly incubated. As these are unknown and very peculiar, I give a figure. They are from 69 to 71 mm. (2.71–2.79 in.) long, with a diameter of 44–45 mm. (= 1.73–1.77 in.)."

These scanty data were almost all that was known until Mr. Seebohm visited the Yenisei, and this traveller was the first among English ornithologists to get a nest (with two

[1] Yarrell's *British Birds*, vol. iv. pp. 282-283.

eggs) in the valley of the Yenisei in the year 1877. He observed these geese with their young broods on the banks of this river at the end of June. In 1895 Mr. H. L. Popham had the good luck to find four nests in the Yenisei district, containing respectively 7, 7, 8, and 9 creamy-white eggs. The females in each case were shot from the nest. The nests were placed at the foot of a cliff occupied by a peregrine or rough-legged buzzard, and well lined with down.[1] They are described as resembling those of the bean-goose,[2] but smaller. The creamy-white eggs, of which the shell is very fragile, have an underlying green tint showing through.

As Mr. Göbel measured and weighed only one egg of the red-breasted goose, I give a table based on the scanty data available.

Breadth or diameter from 45–55 mm. (= 1.73–1.77 in.).
Length or diameter from 69–72 mm. (= 2.71–2.83 in.).
Weight (one example) 600 cgrm.
Göbel's egg: breadth 45 mm. (= 1.73 in.), and length 72 mm. (= 2.83 in.).

The young in down are still unknown. In this, as in other geese, the moulting of the old birds begins immediately after hatching. Thus, Dr. Radde states that the geese of this species kept in captivity at Tiflis began to moult at the end of June, from which it may be inferred that, when wild in the north, they do so rather later, probably not before the middle, or even the end, of July. Although we are not in a position to determine the date of the autumn migration southwards, yet we may safely assume this to be simultaneous with that of the lesser white-fronted species.

Deferring mention of its habits till later, we give here Mr. Zhitnikov's interesting notes on this species made on the Atrek.

This naturalist saw no kazarkas (as the natives call this goose) on the lake[3] until January 22, but on that day, "having arrived at the lake in the morning, I was struck," he writes, "by the extraordinary number of kazarkas gathered there before daybreak, the whole eastern shore being thickly covered with a black mass of them, which at dawn flew off to feed in the steppe beyond the Atrek. Previously on that day I had noticed some difference in the cry and flight of the birds, but I explained the assembling of these flocks on the hitherto deserted lake by the natural sociability of birds preparing to migrate. On the following days we shot in the Gudri Olum, where I saw the first traces of the spring passage then just beginning, and, together with a noticeably increased number of ducks, observed also some new birds. G. M. V——, for instance, killed a glossy ibis from a flock evidently migrating. Having returned home, I learned that a rare goose had been killed on the lake, which, to my astonishment, I found to be a red-breasted goose (*Anser ruficollis*). I now realised the reason of the host of geese on the lake on January 22, and their strange cries: evidently they were passing flocks of the red-breasted species. But whence had this splendid bird come, since there were no traces of its wintering on the Atrek?" Here the author relates how he had previously heard at Christmas from an officer from the neighbouring Russian post in Persia (Gumbet-Kobuz, 45 versts distant from Chatly) that a number of birds had appeared there, larger than ducks and smaller than geese, of a "chocolate" colour, resembling in flight and call the white-fronted goose, which also winters there. The author continues: "I am now convinced that the 'chocolate-bird' wintering in Persia was undoubtedly the red-breasted goose, flocks of which, evidently moving north, I saw on this

[1] *Ibis*, 1897, pp. 96-100.
[2] Genus *Melanonyx*, species unknown.
[3] Middle stream of Atrek.

lake. During these days, after January 22, there was an unusual number, even to the eyes of the natives, of these birds everywhere—in the steppe, on the washes of the Gudri-Olum, and on the lake. They were clearly birds of passage joining those wintering on the lake that caused the increase in the number of geese.

"The days were very warm, and the nights moderately cold. From a Cossack officer we learned that these geese pass the night on the lake, and in the daytime fly off to the steppe, coming back only to drink. They keep only to the flat shore, allowing no one to approach within even several hundred paces."

The same author gives a very lively and interesting description of his first shooting geese from pits dug on the shore, whence it appears that this species grazes in the steppe in company with lesser white-fronted geese.

The author says he purposely abstained from shooting for two days on the lake, in order to allow the geese to become familiar with the appearance of his ambush; but on the third day he and his companion were already seated in their pits at break of day. "Thick clouds of geese (of both species) got up from the shores of the lake, cackling incessantly, and flew off to the steppe; and the abandoned lake now contained only sheldrakes and avocets. A belated gaggle of geese had alighted near my place of concealment, but a white-tailed eagle at once dispersed them, giving me no chance of shooting.

"We sat in our pits to no purpose until eight o'clock, and then went to the river, to drink tea, on our way putting up brahmini ducks feeding in the steppe grass. Having finished our tea,—a nasty, muddy infusion from the river, but not brackish,—we again took up our posts in the pits, after carefully screening them with grass.

"At ten in the morning the call of the geese resounded from the Atrek; a series of black streaks showed from beyond the river; nearer and nearer they flew, and the whole steppe round was filled with clouds of birds. To gain any idea of the vast masses that collect to migrate, one must actually see this host of geese, and hear their cackle, which drowns the human voice. Without any exaggeration, it may be said there were tens of thousands of birds; some of the flocks containing from at least 300 to 500 birds. Flock after flock arrived on the lake; the first parties were followed by others, and from beyond the river appeared the ever-approaching squadrons. They flew for the most part in masses, and only small flocks of 10 to 20 geese disposed themselves in transverse lines.

"It may here be added that in winter the kazarkas generally flew to the water and back in crowds, or more rarely in a transverse drawn-out line, but very seldom in single file or in a 'key,' that is, in a longitudinal line or wedge, like swans, most geese, and cranes.

"The flocks on arrival circled above the lake, and seeing nothing suspicious, settled, although far from the shore; they flew very high and dropped vertically on to the water. The majority of the flocks consisted of *Anser erythropus*,[1] but there were also many *A. ruficollis*, slightly distinguished by the deep black of the belly, the bright white streak on the wings, and their squeaky, shriller-toned note compared with the white-fronted species, as well as by their notably inferior size. The last flocks, seeing their fellows already sitting on the water, descended much lower as they approached the lake." Then follows the account of the day's shooting, which, notwithstanding its interest, we omit, taking up Zhitnikov's story at the place where it has a more direct application to the present subject.

"Two days later we again went to the lake, but sat in vain the whole day in our

[1] That is, the lesser white-fronted (*A. finmarchicus*) of the present volume.

pits; there were only two or three flocks of geese in all, which showed on the lake at noon, to leave at once for the steppe, whence they returned no more. Evidently the main body had flown past to the north, and in fact a few days later we heard that a large number had appeared in the steppes at Yagly-Olum (45 versts north of Chatly, on the Atrek). Clearly the birds, having wintered far from the sea, in the valleys of Persia, travelled north, not by the shore, the Urals, and the Kirgiz steppes, as they are wont to fly from the Caspian to the tundras of Northern Asia, but were moving by the valley of the Atrek and subsequently the Transcaspian desert, once the Atrek and its tributaries were left behind."

Farther on we read: "On February 12 we rode out to Gudri with G. M. The kazarkas were still fewer; grey-lags in the same numbers as before; flocks of *Tringa* appeared, and we saw many lapwings on passage. From time to time were seen flocks of *Pterocles arenaria* and *Alchata severtsovi* returning to the north. It should be mentioned that in the Persian valleys, about the river Gyurgen, there winter millions of lesser bustard and turkushkas (*Vanellus gregarius*), and also common bustards. We now received the news that about a month previously kazarkas, both kinds of bustard, and in part the turkushkas had disappeared from the neighbourhood of Gumbet-Kobuz. Reckoning three to four weeks backwards from the day we received this information, we obtain approximately the date of the kazarkas leaving the Gyurgen; that is to say, they must have disappeared between January 18 and 23; and, indeed, on January 22 they were with us on the lake. Is it not, then, manifest that the kazarkas, which remain here till February 5, arrived from Persia, from the Gyurgen, moving northwards by the valley of the Atrek and not by the seashore? I dwell specially on this point, because the migration routes of the red-breasted goose have been strictly determined, and include the shore of the Caspian and the rivers Volga, Ural, Tobol, Irtysh, and Obi, while there was hitherto no evidence of the passage of the geese along the Atrek."

Leaving these interesting observations of Mr. Zhitnikov, we turn to Dr. Radde in his *Ornis Caucasica*, who writes as follows:—

"I know of this most beautiful of all the kazarkas from the whole south-western shore of the Caspian, but only as a winter visitor. In the middle of March there were no more red-breasted geese at Lenkoran; they had already left for the north-east.[1] Near Baku it is known to every one, and I saw it there at the house of the Vice-governor Glinozarev, a great bird-fancier, in the company of spoonbills, flamingoes, brahmini ducks, and sheldrakes, in 1867.

"Two specimens were once brought to the so-called acclimatisation garden at Tiflis, where, without any care, they lived with the domesticated fowls, and were perfectly tame. They graze like ordinary geese, that is, crop the young short grass, and, in captivity, at first take no other food. Later on they get used to barley and wheat, but green food, by preference young shoots of grass, is still necessary to them.

In November 1879 these kazarkas were not yet to be found near Lenkoran. They appeared only when the cold weather had set in, and kept to the north on the fresh-water lowlands, in the steppe-zone, and especially on the spots thickly covered with herbage. They flew out for the night far to sea, returning towards morning in large crowds for the pastures.[2] They are said to collect in considerable numbers on the Burani Islands, not far from the Kizil-agach shore, to the north of Sari Island. There, on

[1] I give a free and somewhat abbreviated translation of Dr. Radde's account.

[2] Notwithstanding my late friend Dr. Radde's statement that the kazarkas flew out "to sea" for the night, I am firmly convinced they pass the night not on the water but on uncovered sandbanks or on islands.

one of the islands, called Yershan, are situated the favourite haunts of these beautiful geese; and there they assemble in dense throngs before migration. At first 20 to 30 together, then 80, 100, 200, and finally all the flocks, unite into one general mass, and leave all together in the beginning of March. Their departure depends, however, on the weather, and when, on March 17, 1880, I visited this locality, I did not find a single red-breasted goose. In one year, at the end of February, at the same spot, on the meadows near the fish-factory, after a heavy fall of snow, more than 200 of these splendid birds were caught in a net at once. For this purpose an area of 10 to 15 square fathoms was cleared of snow, where the hungry geese alighted, as all the country round was covered with snow. A coarse-meshed net was then cast over them by the concealed fowlers, and the whole flock taken.

"Unfortunately I arrived too late, and all these birds were sold for a mere song—5 to 10 kopeks each—for down and feathers."

Later on Dr. Radde writes: "I had no better luck in the Molokan settlement Astrakhanka, where in the memory of man there had not been so many of these geese as in the winter of 1879-1880. The flocks were then composed of thousands of birds, and when they got up they darkened the sun, at least so the natives said; but when I arrived, on March 19, not a bird was left. They were destroyed in such numbers that even the worst shots got more than 200 apiece. They were shot from pits in which the fowlers hid themselves. Only the down and feathers were made use of.

"Their flesh is dry and tough, and the majority of the birds were extraordinarily lean.[1]

"On February 8/20, after a prolonged blizzard from the north, the first example of this goose was killed in Lenkoran, from a flock of 200 which flew over the town. After deep snow had fallen, the Tatars set their nets on several pools, and some of these geese were taken, which I secured, but unfortunately with rather crushed wings. It is simply astonishing how quietly and resignedly these birds, as also wild swans, behave immediately after they have been deprived of their liberty. Their tameness and trustfulness in captivity are only equalled by their wildness and wariness when free. The Tatars told me that where these geese had once been taken in nets no others would ever alight. They consider the red-breasted geese the wisest of all birds. My captives at first commenced to clean and preen their crumpled feathers, lifting their wings with rather jerky movements, drawing in their heads as they rested, and ruffling up the silky plumage of their crests and necks. Thus they stood in the enclosure, from time to time uttering a very short trumpet-like note; but when any one approached them they began to hiss. They possess the characteristic dissyllabic goose-cackle, which they employ as a call when seeking each other. I heard it every time they got separated in the garden and wished to find one another again."

Dr. Radde further relates how, having become used to their situation, these kazarkas showed their curiosity and examined the enclosure with stretched-out necks.

"They begin to moult at the end of June."

Lepekhin says of this species: "It becomes as sociable and accustomed to live in houses as it is wild and cautious when free. In a week's time it may be fed from the hand. Its flesh is not disagreeable, and is excessively fat. Its note is quite distinct from that of the domesticated goose, and more like that of a sea-gull."

Ménétriés writes almost the same, but in fewer words, with regard to the ease with

[1] Only on this account was their flesh bad; that of fat specimens is very tender and good eating. Dr. Radde also considered the white-front unsavoury!

which these birds are tamed. There is evidence of their breeding in captivity, and although they have not reared young in the London Zoological Gardens (according to Dr. Sclater), they have more than once successfully nested in several other gardens of Western Europe. Dr. Sclater[1] states that a female of this species, acquired in 1853, paired with a *Branta bernicla*, but there was no offspring from the union.

From the above it will be seen that we are fairly well acquainted with the winter haunts of these geese, and their habits in captivity, as well as with the main routes of their migration, but we have as yet no information about their summer life on the little accessible tundra of the north.

The reader may see these geese at rest and on the wing, in company with white-fronts, in Dr. Sushkin's frontispiece to this book.

[1] *Proc. Zool. Soc. London*, 1880, p. 502.

Genus *Branta*, Scopoli (1769)

HEAD with beak and legs black; white upper and under tail-coverts reaching tips of tail-feathers.

THE BRENT GOOSE

BRANTA BERNICLA, LINN.

Plate 16

English—*Brent-Goose*; *Brent*; *Black Goose*; *Sea-Goose*; *Bernicle* (incorrectly locally); *Ware-Goose*; *Barnacle-Goose* (Ireland); *Rott-Goose*; *Rat-Goose*; *Road-Goose*; *Rood-Goose*; *Clatter-Goose*; *Quink Goose*; *Crocker*; *Horra-Goose*; *Horie-Goose* (Shetland).

Russian—*Chernaya kazarka* (book name); *morskaya kazarka* (Petersburg); *nemók*[1] (locally, incorrectly); *nimok* (in some authors); *gus-nemók*; *cherny gus* (Turukhansk); *revushka* (Pomore, acc. Pleske); ? *klokot* (cited by Dal, without stating to which species it is given; very probably to this).

Samoyed—*Wurràh* (on Kolguev, acc. Trevor-Battye); *Pardén-yeptau* (on Pechora, *teste* Seebohm); *Kulá* (Taimyr peninsula, *teste* Middendorff).

Yakut—*Kara-kház* (on Boganida, = black goose).

German—*Ringelgans*; *Rottgans*; *Meergans*; *Brantgans*; *Brentgans*; *Klostergans*; *Mönchgans*; *Bernikel*; *Grauente* (?).

French—*La Cravant*; *Bernache cravant*; *Oie cravant*; *Bernache à collier*; ? *Oie marine.*

Finnish—*Sepel-hanki*; *Musta-hanki* (black goose).

Anas bernicla, Linn., Syst. Nat., i. p. 198, No. 13, *partim* (1766).
Brenta, Brisson, Orn., vi. p. 304, pl. xxxi. (1760).
Branta bernicla, Scopoli, Ann. I. H. N., p. 67 (1769); Trumbull, Names and Portraits of Birds, p. 5 (1896?); Salvadori, Cat. Birds Brit. Mus., xxvii. p. 119 (1895); Ridgway, Man. N. Amer. Birds, p. 119 (1887).
Anser bernicla, Bonnaterre, Encyclop. Méthod., i. p. 121, pl. 32, f. 4 (1790); Kessler, Russk. Orn., p. 368 (1847); Middendorff, Sib. R., ii. p. 228, pl. xxi. (pull.) (1851) (*forma typica et v. glaucogaster*).
Anas monachus, Beseke, Vög. Kurl., s. 45, taf. 5 (1792).
Anser torquatus, Frisch, Vög. Deutschl., ii. pl. 156; Naum., Vög. Deutschl., xi. p. 393, pl. 292 (1842); Severtsov, Per. Yavl. Zh. Zh. Pt. Voron. gub., p. 226 (1856).
Anser brenta, Pallas (*partim*), Zoogr. Ross.-As., ii. p. 229 (1811); Seebohm, Hist. Brit. Birds, iii. p. 508, pl. 66 (egg), 1885; Menzbier, Pt. Ross., i. p. 724 (1895); *id.*, Promysl. Pt. Ross. i Kavkaza, p. 460, pl. 130 (1902); Kholodk. i Silantiev, Ptitsy Yevr., p. 524, pl. 42, fig. 6 (1901); Silantiev, Opred. Yevr. Pt.,

[1] *Nemok* is properly the name of the Eastern black kazarka (*B. nigricans*), a description and figure of which are given in the present work.

p. 112 (1901); Buturlin, Sinopt. tabl. Okh. Pt. Ross. Imp., p. 42 (1901); *id.*, Dikie Gusi Ross. Imp., p. 7 ("Psov. i Ruzh. Okh.," Feb.-Apr. 1901); *id.*, Tabl. opredel. Plastinchatokl. ("Psov. i Ruzh. Okh.," 1900); Vavilov, Okh. v Ross., iv. (Voda), p. 43, 1873; Sushkin, Pt. Ufimsk. g., p. 67 (1897).

Bernicla torquata, Boie, Isis, 1822, p. 563; Newton, Dict. of Birds, p. 375 (1893).

Bernicla brenta, Stephens, Gen. Zool., xii. 2, p. 46 (1824); Baird and Ridgway, Water Birds of N. America, i. p. 467 (1884); Coues, Key N. Amer. Birds, 2 ed., p. 687, fig. p. 686 (1884); Shelley, Birds of Egypt, p. 281 (1872); Büchner and Pleske, Beitr. Ornit. S.-P. G., No. 179 (1881); Büchner, Pt. Spb. gub., p. 513 (1884); von Heuglin, J. f. Orn., 1871, p. 164 (Spitzbergen); *id.*, J. f. Orn., 1872, p. 120 (Novaia Zemlia); Sabaneev, Ukazat. Kn. i St. Okh. i Zool. Soderzh., pp. 455-458 (1883) (*pro parte*); Pleske, Vög. Kola Hlbns., p. 245 (1886); Heuglin, J. f. Orn., 1872, p. 120 (Novaia Zemlia); Gillett, Ibis, 1870, p. 308 (Novaia Zemlia); Pleske, Krit. Obz. Ml. i Pt. Kolsk. pol-va, p. 347 (1887); Alphéraky, Kuldzka i Tian-shan, p. 67 (oz. Sairam) (1891); Smirnov, Orn. Jahrb., xii. 1901, pt. 6, p. 208; Trevor-Battye, Ice-bound on Kolguev, pp. 197, 224, 226, 257, 300, 424 (1895); Pearson, Beyond Petsora, 314 (absence on Novaia Zemlia) (1899); Macpherson, History of Fowling, 1897, p. 221.

Bernicla glaucogaster, Brehm, Isis, 1830, p. 996; *id.*, Handb. Vög. Deutschl., p. 849 (1831).

Bernicla micropus, Brehm, Isis, 1830, p. 996.

Bernicla platyuros, Brehm, Isis, 1830, p. 996.

Bernicla collaris, Brehm, Isis, 1830, p. 996.

Bernicla melanopsis, Macgillivray, Man. Br. Orn., ii. p. 151 (1842).

Bernicla pallida, Brehm, Vogelf., p. 368 (1855).

Bernicla brenta and *glaucogaster*, Bonaparte, Compt.-Rend., xliii. p. 648 (1856).

Brenthus bernicla, Heuglin, Reise Nordpolarmeer, iii. p. 132 (1874).

Anser (*Brenthus*) *torquatus*, Reichenow., Orn. Centralbl., 1882, p. 37.

Anser brenta glaucogaster, Seebohm, Hist. Brit. Birds, iii. p. 508 (1885).

Branta brenta, Dubois, Faun. Belg., Ois., ii. p. 388, pl. 243 (1892); Taczanowski, F. Orn. S. Or., p. 1104 (1893).

Anser brenta leucogaster (*lapsus calami*), Menzbier, Pt. Ross., i. p. 724 (1895).

Adult Females and Males

Head, neck, and breast smoky black. On sides of upper half of neck (where tufts of feathers, separated by furrows, are less strongly marked than in grey-lags or representatives of genus *Melanonyx*) lies a small white patch, consisting of stripes or streaks, more or less scattered. Sometimes, but comparatively rarely, these white patches almost meet on the anterior surface of the neck.[1] Brown blackish-grey colouring of back interrupted by very narrow greyish edgings of feathers; rarely (perhaps in younger, although mature birds?) these greyish edgings with a rusty or coffee tint. Belly and flanks also brown-grey, with greyish edgings to feathers wider than at back, these edgings posteriorly becoming wider and lighter.

Rump and tail black-brown; latter consisting ordinarily of 16 feathers, but sometimes, according to Naumann, of 18—a number which I have not seen. Tail-coverts, both upper and lower, and vent pure white. Tail-coverts reaching tips of tail-feathers, so that the tail, from above and below, appears white, the dark outer tail-feathers being visible only laterally.

Upper wing-coverts, as also primary coverts, grey-brown; under wing-coverts and axillaries brown blackish grey. Alulæ and all flight-feathers very dark brown-black, with white shafts to feathers in basal third. Secondaries considerably darker than others. Bill black; iris brown-black; eyelids black, alike on the feathered and the unfeathered part. Legs, feet, and claws black, with greenish or olive tint on surface of digits and on bend of heel-joint. Female, as in all geese, somewhat less in size than male, but difference slight.

[1] If we raise, at the level of these white patches, the more elongated black plumules of the back of the neck, and also anteriorly (where the black plumules are not elongated), we find here also white spots more or less developed, so that a complete white ring may always be traced round the neck, although composed of discrete white spots.

The material at my disposal, however, was not sufficient to establish the extremes of the dimensions for the two sexes.

Total length, ♂ and ♀	584–889 mm. (= 23.50–30.50 in.).
Wing	312–345 mm. (= 12.30–13.60 in.).
Culmen	30–38 mm. (= 1.20–1.50 in.).
Tarsus	53–61 mm. (= 2.10–2.40 in.).

The number of teeth on each side of the upper mandible is 28–30 in the examples I have examined, but perhaps these are not the extreme limits.

Younger Adults

General colouring somewhat lighter than in old birds. Often rufous or coffee tint on edgings of feathers of upper surface; white patches on sides of neck less developed.

Young Birds in First Plumage

White patches on sides of neck absent; breast scarcely darker than belly and flanks, and latter without light edgings to feathers; lesser wing-coverts with conspicuous light greyish edgings; median and greater wing-coverts with very light whitish edgings. Inner secondaries with greyish-white tips.

Young in Down

Above dark grey, below greyish white, without any yellowish tint; cheeks and throat whitish; end of nail on upper mandible whitish (Middendorff).

The above descriptions concern the dresses of the typical form of this goose, from which the following form, *Branta bernicla glaucogaster*, differs apparently only by the colouring of the under surface of the body, and its somewhat different range, which will be discussed in its proper place. On account, however, of the difficulty of distinguishing to which of two races of brent (so often confounded by authors), many statements refer, I have cited the whole at the beginning of the present notice.

Geographical Distribution

The breeding-grounds of this goose at the present day nowhere extend south of the Arctic circle. The species is credibly known to nest eastwards on the Taimyr peninsula, but as to the still more easterly part of Siberia we cannot yet say where it meets the black brent, although it is quite possible that, before this sees the light, Baron Toll's expedition to the New Siberian Islands will have thrown considerable light on this question.[1] In the Taimyr peninsula this brent has been found on the eastern coast in 77° N. lat.; on the western, between 75° and 76⅔° N. lat.; on the river Boganida in 70°, and on the river Taimyr in 73⅔° N. lat. On the Yenisei it has not yet been found south of 72° N. lat., where Mr. Popham obtained young in down. To the west of this point it doubtless breeds over the whole tundra to the Kaninsk peninsula, although there are no trustworthy data on the subject. It nests in Novaia Zemlia and Kolguev, where it breeds in large numbers, and probably for the most part in the north-eastern part of the former island. Farther north it

[1] Birulya, the naturalist of the expedition, has brought a black brant from these islands (1904).

breeds in Franz-Josef Land and in Spitzbergen. It is quite possible that it may also prove to be a nesting-bird in Iceland, although it has not yet been recorded as such.

The breeding-places of this goose authentically recorded are thus very few in comparison with the incredible number of individuals met with in its winter haunts, and this confirms my idea that other vast nesting-grounds must lie between the Yenisei on the west, the Yalmal, and the Kaninsk peninsula—along the shore of the Arctic Ocean.

This species winters mainly on the shores of North Germany, Denmark, Holland, Belgium, Northern France, Great Britain, and even Portugal. At times it descends south to the Atlantic coast of Morocco, where it is perhaps even a regular winter visitor. It is also very probable that it winters in small numbers on the Faroes, where it is a common bird of passage. In winter it is met with at various points in the Mediterranean basin and in Lower Egypt.

The migratory routes of this species are described by Professor Menzbier as follows: "The brent undoubtedly breeds on Kolguev and Novaia Zemlia, and perhaps on Vaigach. It arrives there by two routes—namely, the Norwegian, from the side of the Varanger-fjord, following the coast of the Kola peninsula to Kaninsk and thence to Vaigach and Novaia Zemlia, and also from the side of the Baltic. The latter line begins at the southern end of the Baltic with two branches, one going over Lifland and the Peipus to the Gulf of Finland, the other leading to the same point by the Estland coast. After crossing the Gulf of Finland, the brents collect on the Aland Islands and Nyland coast, and thence strike across the lake region for the White Sea, avoiding Archangel, where a stray specimen of this bird is only rarely met with. Having reached the throat of the White Sea, the flocks proceed along the eastern coast of the Kola peninsula, through Ponsi, Tri Ostrova, Sosnovets, Morzhovets, and then make for Novaia Zemlia."

This sketch of the migration is perhaps quite true, but it seems certain that not all the brents travelling by the Baltic shore turn off to Vaigach and Novaia Zemlia, a large number of them passing straight over Finland and Lake Ladoga eastwards, while others probably go direct by the mainland to the Taimyr peninsula. At any rate I have myself (during the autumn passage) observed for several years running, and have even shot, brent flying straight from east to west from Lake Ladoga across the lakes of the Vyborg Government in a vast number of large flocks. It is true I have not seen their return passage by the same route in spring, but, according to the statements of the natives, a migration occurs every year from west to east in the month of May. It is undoubtedly owing to this line of migration that the bird is met with on passage about Turukhansk[1] and in the Governments of Perm and Ufa. In September the "sea kazarkas," as they are called on the coast, appear near St. Petersburg,[2] and somewhat later cross Scandinavia in a south-westerly direction. By this route from the Taimyr peninsula, I assume, they stray into the interior of European Russia, as in the Moscow Government (Lorenz) and Poland (Taczanowski). Such visitations (or more properly migrations) almost substantiate, I think, Professor Menzbier's hypothesis that this goose "perhaps gets to the Black Sea in winter." As regards the Caspian, I have been unable to find any indications of its appearance, even as a straggler, at that season.

In September or the beginning of October, the geese flying over the Baltic and through Scandinavia begin to occur in ever-increasing numbers off the coasts of Jutland, in

[1] Called in Pallas's times Mangazeya, a name often mentioned in his works.

[2] The passage occurs also in October; the spring return passage is in April and May.

Schleswig-Holstein, where they collect in countless hordes; they also appear along the shores of the North Sea, and in vast crowds on the coasts of Holland, Belgium, and Northern France. Considerably later, as we shall see below, these geese occur on the seas around Great Britain. They winter some years in millions on the northern coasts of France, "where the notes of countless flocks," says Naumann, "drown the roar of the waves, and where their swarms from afar darken the light like smoke."

In concluding this review of the geographical distribution of the present species, I may once more remark that there are two great gaps in our knowledge of its breeding and wintering in Russia, namely, as regards its nidification on the shore of the Arctic Ocean between the Kaninsk peninsula and the Yenisei, and its wintering on the Black Sea. Until these gaps are filled up, much in the lines of migration of this bird must remain quite unintelligible.

It is a somewhat curious fact that we know scarcely anything at all about the habits of this goose in Russia, and that the little which has of late been learned has not been acquired by Russian subjects. Much interesting information about its mode of life on Kolguev has been supplied by Mr. Trevor-Battye, who writes as follows: "I never saw the nest or egg of a Kolguev brent. No inducement which I was able to offer to the Samoyeds could extract from them any information as to the breeding-places of the birds, until the Russians arrived in August, and with their help I got from Uano a reluctant admission that they nested on the southern and north-eastern ends of the island. They hold the bird in almost superstitious regard because of its extreme importance to them as winter food. I believe that they themselves never approach the breeding-grounds during nesting-time. For this they gave as their reason that a dog or a gun would make them all desert. The Samoyed dogs are encouraged as bird-hunters, and a Samoyed cannot understand that it is possible to go out without such companions.

"The only reason I have, then, for assuming that the brent goose nests on Kolguev is the word of the natives and the appearance of vast numbers of old and young birds off the sandbanks in July."

A little farther on the same writer makes an important and perfectly new statement regarding these geese, thereby enriching the ornithological fauna of the district by a new form. "Of the adults, two forms were clearly distinguishable. In the majority the lower breast and belly were slaty,[1] but a large proportion had these parts light as mother-of-pearl;[2] and there were some old birds in which the light fringe of the slate-coloured breast-feathers was so wide that the bird could not easily be referred to either category. In one bird, a male, in my possession, the neck and the tail-feathers are light brown; apart from this, it may almost be called a white bird."

Of the nidification of this goose we have very incomplete information. The nest is very simply constructed, as indeed is the case with all geese; the material used being leaves, grass, dry water-weeds, and, of course, a lining of down and feathers. Some ornithologists consider that the number of eggs in a clutch is usually four, but it undoubtedly often reaches six, and even nine. Although they usually build their nests on the ground, yet it sometimes happens, as, for example, in Spitzbergen, that these geese nest on rocks in the neighbourhood of the nests of eider-ducks. The eggs have a thin shell, and are either delicate straw

[1] *i.e. Branta bernicla*, the typical form.

[2] *i.e.* the light-bellied form, *Branta bernicla glaucogaster*.

or greenish white in colour. According to Mr. Göbel, the eggs of the black-legged geese in the structure of the shell approach those of the ducks. The following are the dimensions for this species :—

Diameter	46–56 mm. (= 1.81–2.20 in.).
Length	66–74 „ (= 2.59–2.91 „).

But Mr. Göbel gave me the annexed table of measurements and weights, based, unfortunately, on only six examples, so that it seems we are still far from knowing the extreme dimensions and weight of the eggs of this goose.

Max. breadth 51 mm. (= 2 in.), with 79 mm. length (= 3.11 in.), and 714 cgrm. weight (Spitzbergen).
Min. „ 46 „ (= 1.81 „), „ 71 „ „ (= 2.79 „), „ ? „ „ (Greenland).
Max. length 79 „ (= 3.11 „), „ 51 „ breadth (= 2 „), „ 714 „ „ (Spitzbergen).
Min. „ 71 „ (= 2.79 „), „ 46 „ „ (= 1.81 „), „ ? „ „ (Greenland).
Max. weight 756 cgrm., with 48 mm. (= 1.88 in.) breadth, and 72 mm. length (= 2.83 in.) (Spitzbergen).
Min. „ 678 „ „ 48 „ (= 1.88 „) „ „ 73·5 „ „ (= 2.89 „) (Malyya Karmokuly).

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6 examples gave: mean breadth 48 mm. (= 1.89 in.); max. breadth 51 mm. (= 2 in.); min. breadth 46 mm. (= 1.81 in.).
6 „ „ „ length 73 „ (= 2.87 „); „ length 79 „ (= 3.11 „); „ length 71 „ (= 2.79 „).
3 „ „ „ weight 715 cgrm.; „ weight 756 cgrm.; „ weight 678 cgrm.

On July 15 Middendorff found on the river Taimyr goslings which had only just left the egg (he gives a figure), but in some places, as, *e.g.*, on Kolguev, they are evidently hatched rather earlier. It is probable that, during the moulting of the old birds, when the Samoyeds catch them in large numbers by driving them into nets, a vast number of young in down, or those which are beginning to get their feathers, perish. Of the summer life of this species we know nothing.

So far as may be judged from existing data, brent geese, like ducks and many other birds, do not always nest from year to year in the same spots. Middendorff, for example, tells us that his interpreter met with brent breeding in large numbers on the river Pyasina at the time of his first expedition, but on the second he found red-breasted geese and barnacles (*B. leucopsis*), and especially greater and lesser white-fronted geese, but no brent. A similar circumstance occurs in Novaia Zemlia, where this goose certainly nests, although Messrs. Pearson and Fielden did not find it there in either 1895 or 1897.

If the spring and summer life of these geese is almost unknown, the same cannot be said with regard to their life and habits in some of their winter resorts. At the latter season all their habits have indeed been studied in detail by sportsmen, since the brent, on account of its abundance, the excellent quality of its flesh, and the difficulty of securing it, is one of the species most sought after by wild-fowlers. It is, however, almost impossible to recount all the details and niceties of this attractive sport recorded in literature; and this special branch of sea-coast shooting can scarcely be said to be known in Russia.

As I have given a short sketch on the subject in my *Utki Rossii*, I will now content myself with quoting from various authors descriptions of the habits and life of these geese in their winter haunts.

One of the best observers and authorities on wild-fowl in England, and a most experienced sportsman, Mr. Abel Chapman, writes as follows in his excellent *Art of Wildfowling*:—

"These geese are the latest to arrive of all our winter wild-fowl. The average date for their appearance in force (on the N.E. coast) falls after Christmas. Though stragglers may come in November, one cannot rely on having them here in numbers before January, and in some seasons much later. Thus during the present winter (1896) the chief arrival occurred in the second week of February; and in the memorable season of 1886 we had very few till as late as March, when they came in quite unprecedented numbers, as I have elsewhere described. An excellent general index of their abundance or scarcity on our coast is afforded by the state of the ice in the Sound at Copenhagen and in the Cattegat, which information is daily reported at the season in the shipping newspapers."

In another paragraph the same author writes as follows:—

"To return to our geese. To such spots, where miles of mudflats flank the land, and dreary sand-dunes separate the slob from the sea beyond, thither flock the brents in black battalions at break of day. By companies and detachments they come in from the sea, clanging down a wild chorus as they speed through the upper air towards green oozes where the *Zostera* carpets the mud with emerald fronds. Black forward and white astern are their predominant colours, and as they lower their flight the long files, now low on the water, resemble giant centipedes crawling along. Now watch them whirl in air like a black swarm of bees, though always maintaining their chain-like formations; to and fro they wheel over their chosen feeding-ground in a hundred concentric, opposing circles, then with a crash of bird-music and flapping of dark pinions the whole host is down. Full five hundred have pitched on the green spit before us, a second company in the bight beyond; but the main army is still on wing. We can see them still flying inwards, bound for the big banks six miles up the estuary.

"The geese at once commence their breakfast; with the glass you can see them all a-guzzle, their black necks down as they advance, tearing up and devouring the trailing blades of sea-grass. For some two hours they will remain intent on breakfast; then one will see little parties going off to drink, splash, and preen in the nearest channel. The mid-day interlude follows, when, should the weather be mild, the whole company indulge for a few hours in rest and play, chasing one another till the water flies, while the volume of sound is a thing to be remembered; not even parliaments are in it with wild geese. Towards afternoon they are hungry again, and feed with desperate energy as the sun lowers to 'take the hill,' for then they know that the time is at hand when they must clear out in one great sonorous host—all bands playing—bound for the open sea."

I find the most varied attempts made by different authors to represent phonetically the call of this goose, but although I have often heard the cry of migrating flocks, I cannot undertake to express it in syllables. It differs greatly from the notes of all the species not possessing black feet, and is perhaps softer, more melodious, and less loud than in the white-fronted or yellow-billed groups; but from the number of individuals in a flock there arises a chaotic ceaseless din so characteristic that, once heard, will not be forgotten. Some compare the notes of a flock of brent on the wing with those of a pack of hounds in full cry, and perhaps with some justice. I was once at early dawn very near (some 200 paces) a flock of about two thousand of these geese, flying towards my boat. I was already approaching the shelter prepared beforehand on the lake, and had only 15 or 20 paces yet to row, when this mass of birds in full clang began to descend upon me, evidently with the view of alighting at the very same spot. My heart beat quicker as

the unwonted sight fell upon my eyes, and I was already hoping, as I lay motionless in my boat, that the geese would settle and allow me first to admire them and then to bag a few. They were already falling from a great height, turning and twisting in the air like teal, and keeping up an uninterrupted cackle; but the leaders detected me, and at once the whole flock, as if influenced by a powerful gust of wind, swerved aside, began again to soar, and eventually left the lake. Then it was, when those many hundred throats were calling near me in the silent morning air, when every sound is borne so clearly over the water, that I realised how far removed is the note of these geese from the loud shrill cry of other species I had heard.

What would have been my impression had a flock of yellow-billed or white-fronted geese flown towards me in like numbers? The cry of the brent seemed feeble, although fairly musical. And I thought that it would indeed require "countless flocks" "to drown the roar of the waves." I shall never forget the feeling of excitement, followed by disappointment, aroused that morning by the brent which, alas! I am not likely ever to meet again in like circumstances.

In the following notice of the light-bellied race of this goose I take occasion to touch once more on the typical form, and thus complete the foregoing account.

THE LIGHT-BELLIED BRENT

Branta bernicla glaucogaster, Brehm

Plate 17

English—*Light-bellied Brent*; in North America—*Brant, Brent, Brand Goose, Common Brant*, etc.
Russian—*Belobryukhaya chernaya kazarka* and *kazarka belobryukhaya* (J. A. Buturlin).

I have given the synonyms of the light-bellied brent under the head of the typical brent, because the former can scarcely be regarded otherwise than as a dimorphous form of *Branta bernicla*, and also because by many authors it has been confounded with the latter. I therefore here indicate only the works of those authors who record it as a distinct form, and of those who undoubtedly had specimens before them, although they did not regard them as distinct.

Brent, Trevor-Battye, Ice-Bound on Kolguev (1895).
Anser bernicla (*partim*), Middendorff, Sib. R., ii. p. 288 (1851).
Anser glaucogaster (Brehm), Buturlin, Dikie gusi R. I. ("Psov. i Ruzh. Okhota," Febr.-Apr., 1901); *id.*, Tablitsy apred. Plastinch. ("Psov. i Ruzh. Okh.," 1900); *id.*, Sinoptich. tabl. Okh. Pt. R. I., p. 41 (1901); Menzbier, Pt. Rossii, i. p. 724 (1895).
Branta bernicla glaucogaster, Bianchi, Yezhegodn. Zool. Muz. Imp. Ak. Nauk., 1902, pp. 325 and 333.

Adult Birds of Both Sexes

These are distinguished from the typical form only by the light mother-of-pearl greyish belly and flanks with admixture of ochreous-brownish tint; but according to Mr. Trevor-Battye perfectly intermediate examples occur which it is impossible to assign to their proper form. Upper part of body apparently in general somewhat lighter than in the majority of the typical form.

Other Dresses

Correspond to those of brent, but at all ages lighter belly. Dimensions coincide with those of *B. bernicla*, viz.:—

Length	596–774 mm. (= 23.5–30.5 in.).
Wing	309–345 mm. (= 12.30–13.6 in.).
Culmen	30½–38 mm. (= 1.20–1.5 in.).
Tarsus	53–61 mm. (= 2.1–2.4 in.).
Eggs: width	51 mm. (= 2.02 in).
„ length	74 mm. (2.92 in.).

Geographical Distribution

In addition to Russia, the light-bellied brent occurs in Eastern Arctic America from Parry Island to Greenland inclusive, and from 73° N. Lat. northwards "as far as land is found." It is also met with as a winter straggler in the Mississippi valley. In Europe it has been found locally, wintering with the typical form, but in far less numbers. In Russia it was found by Middendorff, who also did not recognise it, on the western part of the Taimyr peninsula, by Mr. Trevor-Battye in Kolguev, and by Messrs. Fielden and Brown in Novaia Zemlia, the specimen from the latter locality being distinguished by the white spots becoming confluent on the anterior surface of the neck.

I have only seen one example of this bird of Russian origin, which was brought by Middendorff from the Taimyr peninsula, and I am able to state that it agrees in colouring with the drawing on Plate 17. We may thus consider with certainty that the Kolguev and Novaia Zemlia birds do not essentially differ from the one figured, although the latter was obtained in April 1889 on the island of Monomoi, in the State of Massachusetts. I cannot, however, decide whether there are any differences between the European and the American *B. bernicla glaucogaster*, since I have not had a single example of the latter in my hands. It would be no less important to examine the intermediate forms between the light-belly and the brent which Mr. Trevor-Battye writes of in his book on Kolguev, but it seems that this author did not bring back any specimens. My hopes of receiving Kolguev examples from Mr. Buturlin, who made a scientific expedition to that island in 1902, have also not been realised, as that talented and energetic naturalist arrived on Kolguev after the geese had finished moulting, and was then too late for the great catch of moulting birds by the Samoyeds; such fledged brent as he shot proved to be of the typical form.

The simultaneous occurrence on Kolguev of the typical and the light-bellied forms, that is, of two distinct races of one species, is at first sight a very unusual circumstance, but analogous instances are known among insects. Apparently we may have either (1) dimorphous forms of one species, or (2) two separate independent species, breeding together and producing as the result of crossing those intergrading examples of which Mr. Trevor-Battye speaks. The latter supposition is, however, in itself but little probable, since, beyond the substitution of light for slate colouring on the under surface of the body, no difference exists between these birds.[1] The first hypothesis, viz. that *B. glaucogaster* is a simple dimorphous form, as it seems to me, explains very simply the circumstance of these geese being found breeding together. Among Lepidoptera I know cases where, for example, a certain species is dimorphous in one locality (sometimes only with the males, at others only with the females), while in other places the same species may appear in one or other of its forms as a permanent variety or sub-species.

Thus there is a species of butterfly of the genus *Lycæna*, in which in a certain locality the males are dimorphous—some with brown wings, others with blue; while all the females are uniformly brown. In other localities this same species shows a monomorphous male, for example, with brown, and elsewhere with blue wings; and this phenomenon is permanent.

The same is the case, I think, with this goose, which is dimorphous in Kolguev,

[1] Which still requires further investigation, at present impossible from the lack of material for comparison, with the exception of the Taimyr skin of the light-bellied example.

Novaia Zemlia, and Taimyr, and polymorphous (only in its light-bellied form) in North America and Greenland.

How, then, are we to explain the phenomenon that on Kolguev and other northern localities the two forms of the species occur together, while only one of them—the light-bellied goose—is peculiar to North-East America and Greenland?

It seems to me the explanation of this fact is not so difficult as may at first appear; and I think that at one time in both the Old and the New World the two forms were met with, and that while in America and Greenland, by means of crossing, the light-bellied gradually got the better of the dark-bellied form (absorbed or amalgamated it), just the opposite condition took place over the greater part of the range of this species in the Old World, where undoubtedly the dark-bellied form now predominates. In Kolguev, however, and probably in Novaia Zemlia, the struggle between the differently coloured representatives of the one species still continues, and probably one will ultimately absorb the other.

At one time I explained the geographical distribution of dimorphous forms in the Lepidoptera somewhat differently.[1] I considered, for instance, that a species, the home or centre of distribution of which was a particular locality, became dimorphous or even polymorphous, and afterwards only spread gradually to new localities in one or other of its forms, according as this was better adapted to exist in the new surroundings. The explanation I here give of the fact of the occurrence of one form only of *B. bernicla* in America and Greenland, and of two forms of that species in the Old World, seems, however, to be perfectly applicable to the case cited of the range of various forms of one species among the Lepidoptera, or, in other words, that the particular species of the genus *Lycæna* was dimorphous or trimorphous over the whole extent of its range, but that little by little one or other form, according to its greater fitness, has absorbed the other, and that in the localities where dimorphous forms are now met with, the struggle between them still continues, and will terminate in favour of the one best adapted for continuous existence.

If it should eventually prove that the light-bellied brent is not simply a dimorphous form of the common brent, but an independent species (which I consider unlikely), even then, in consequence of the occurrence of both together and their interbreeding (as shown by the intergrading forms in Kolguev), it would be impossible to doubt the existence of a struggle between them of long standing, and destined inevitably to end in the triumph of one of the two, just as a struggle has been and is still maintained locally between grey and black crows.

The appearance on the coasts of England of the light-bellied form of the brent, formerly explained by its coming from Greenland to winter, may now be more simply accounted for by its breeding in Spitzbergen, Kolguev, Novaia Zemlia, and farther eastwards to the Taimyr peninsula inclusive. This question is not yet matured, however, for final decision, as it is first of all necessary to ascertain whether the Russian are identical with the North American and Greenland birds, and if this should prove not to be the case, whether the British birds can be identified with one or the other.

Notwithstanding, then, the probability that it is the Russian light-bellied brent that winters in British waters, this question cannot be regarded as strictly answered, and therefore still remains open.

[1] See article in the *Transactions of the Entom. Soc. Lond.* 1901, pt. iv., "On some Cases of Dimorphism and Polymorphism among Palæarctic Lepidoptera," by S. Alphéraky.

Sir R. Payne-Gallwey, writing of these two forms of brent, observes that, "I have shot a great many adult brent with (1) the lower part of the breast and the abdomen pure white; (2) with these parts of very dark slate, almost as dark as the neck; (3) with a dark breast and abdomen and a patch of white, the size of the hand, on the lower part of the breast. On the British coast I have often killed specimens of both the white and the dark-bellied variety at the same shot. On the shores of North Holland you may shoot an entire winter and not kill, or even see, a brent with a white abdomen; whilst on an estuary in France, out of many hundreds killed last season (1896), by a gentleman-gunner, only one bird had white under-parts."

These last facts seem to indicate the appearance in English waters of light-bellied brent from Greenland, which do not get so far as France and Holland; but what we have learnt from Mr. A. Chapman in the last section clearly testifies that the arrival of brent in England is generally dependent on the state of the ice and weather in the Sound. All this taken together, and the question as to the winter haunts of the brent from Spitzbergen and Franz-Josef Land, so far from clearing, still further complicate the matter.

I hope that my statements of the circumstances requiring explanation in the geographical distribution of this form of brent will not be overlooked by such persons as may be in a position, and who may possess the material, to help to make things clearer than they are at present.

In the plates of bills I have not figured those of the light-bellied and black-bellied forms of the brent, since they do not present any differences.

The present notice was completed when there appeared Mr. V. L. Bianchi's work in the *Yezhegodnik Zoologicheskaya muzeya Akademii Nauk*, 1902, in which (p. 325) the author speaks of four examples of this goose obtained on Spitzbergen by Mr. A. A. Byalnitsky Birulei and Dr. Bunge of the Russian expedition of 1899-1901, and of an egg brought from Hornsund.

Unfortunately the author does not state whether the skins brought from Spitzbergen completely agree in colouring with the *Branta bernicla glaucogaster* of Arctic America, or with the one example brought by Middendorff from the Taimyr peninsula.

THE BLACK BRENT

Branta bernicla nigricans, Lawrence

Plate 18

English—*Black Brent* (N. Am.); *Eskimo Goose* (Fort Yukon).
Russian—*Nemók* (Pallas, Krasheninnikov); *nemká* (Pallas; probably genitive of nemók?); *polyarny gus*[1] (Polyakov); *kazarka chernaya amerikanskaya* (Menzbier); *kazarka chernaya sibirskaya*, and *osheinikovaya kazarka* (Buturlin); *gus nemók* (Maak).
Yakut—*Kharder-khaaz* or *Khardyr-khaaz* (on Lena and Vilyui, *teste* Pallas and Maak).
Kamchadal—*Terad* (Krasheninnikov).
Kuril—*Núkespu.*
Koryak—*Vechópoal.*
Lamut—*Karkalú.*

Anas bernicla, Pennant (*nec* Linn.), Cook's Voy. Pacif., ii. p. 366 (Kamchatka), 1784.
Anser brenta, Pallas, Zoogr. Ross.-As., ii. p. 229 (*partim*), 1811.
Anser nigricans, Lawrence, Ann. Lyc. N. York, iv. p. 171, pl. xii. (1846); Seebohm, Hist. Brit. Birds, iii. p. 508 (1885); Menzbier, Pt. Ross., i. p. 725 (1895); Buturlin, Dikie Gusi Ross. Imp. ("Zh. Psov. i Ruzh. Okh.," 1901); *id.*, separ., p. 8; *id.*, Sinopt. Tabl. Okh. Pt. Ross. Imp., 1901, p. 42; *id.*, Tabl. Opred. Plast. ("Psov. i Ruzh. Okh.," 1900); *id.*, separ., p. 6.
Anas brenta, Sevast., Opis. Kamch. by Krasheninnikov, i. p. 474 (note) 1818.
Bernicla nigricans, Gray, Genera of Birds, App., p. 27 (1849); Nikolsky, Ostr. Sakhalin, p. 225 (1887); Baird and Ridgway, Water-Birds of N. America, i. p. 471 (1884); Macpherson, History of Fowling, 1897, p. 220.
Anas bernicla, Kittl., Denku., ii. p. 384 (1858).
Anser bernicla (*partim*), Schlegel, Mus. P.-B., *Anseres*, p. 103 (1866); Dobrotworski, Tzr. Spb. Otd. Geogr. Obshch., i. p. 23 (1870); Miculs, Ocherk Sakhalina, Pril. k. Selokokhoz. i Lesov., pt. 114, p. 43 (1873); Maak, Amur, Pribavl., p. 144, No. 180 (1859).
Branta nigricans, Bonnaterre, Proc. Ac. Philad., 1870, p. 131; Stejneger, Bull. U.S. Nat. Mus., No. 29, p. 149 (1885); Ridgway, Man. N. Amer. Birds, p. 118 (1887); Stejneger, Proc. U.S. Nat. Mus., x. p. 135 (Bering Isl.), 1887; Menzbier, Okh.-Kamchat. Krai, Dra. Slyunina, p. 346 (1900); Salvadori, Cat. Birds Brit. Mus., xxvii. p. 123 (1895).
Branta bernicla, var. *nigricans*, Coues, Key to N. Amer. Birds, p. 284, fig. 184, b. (1872).
Branta bernicla, b. *nigricans*, Coues, Birds of North-West, p. 557 (1874).
Branta brenta nigricans, Taczanowski, Faune Orn. Sib. Or., p. 1106 (1893).
Bernicla torquata, Black. and Pryer, Ibis, 1878, p. 212 (Japan).
Bernicla brenta nigricans, Coues, Check-list of N. Amer. Birds, 2nd ed., p. 112 (1882), Palmen, Bidr. Sibiresk. Ishafsk. Fogelf. Vega-Exp., pl. vii. p. 426.
Anser (*Brenthus*) *nigricans*, Reichenow, Orn. Centralbl., 1882, p. 3.
Bernicla brenta, var. *nigricans*, Seebohm, Ibis, 1884, p. 32 (Japan).
Anser torquatus, Brandt, J. F. Orn., 1891, p. 267.
Bernicla brenta, Polyakov, Otchet obizsted. na Sakhaline, Pril. No. 6, pl. xlviii. Zap. Imper. Akad. Nauk, 1884, p. 12.

[1] Izsledovaniya na ostr. Sakhaline, "Vladivostok," 1883, NN. 1, 3, 5.

Adult Birds of Both Sexes

Colouring as in ordinary brent (*Branta bernicla*), but on the whole considerably darker and blacker. Bill said to be somewhat more massive and broader at the base, although I cannot confirm this, as I have not found these differences in dry skins, but my material was small.

On neck a white collar, much broader than in common brent, and always closed in front, and almost always so behind; I have, however, met with examples, perhaps not very old, but apparently adult, in which the junction of the white collar behind was incomplete, but became so only on raising the elongated black plumes of the neck.

Head, neck, upper part of body and breast, very dark brown-black; under-part of body, that is, belly and flanks, dead black, almost indistinguishable from black of breast, but still more sharply contrasted with the pure white of the hind part of belly and vent. Both upper and under tail-coverts, which completely reach the tips of the brown-black tail feathers, pure white. Soft-parts black, as in common brent, and under-part of wings as in latter, but slightly darker.

Length	560–730 mm. (= 22–29 in.).
Wing	330–350 mm. (= 13–13.75 in.).
Culmen	30–36 mm. (= 1.20–1.35 in.).
Tarsus	56–66 mm. (= 2.20–2.50 in.).

Weight from $3\frac{1}{2}$ to 5 English lbs., and probably sometimes rather more.

Young Birds

Colouring as in adults, but white collar obscurely marked and totally wanting in birds in first plumage. Greater wing-coverts and secondaries with white tips; feathers on flanks entirely greyish brown without white tips (Ridgway).

As is apparent from this description, neither dimensions nor any other essential characters, with the exception, perhaps, of a rather more massive bill,[1] distinguish this bird from the common brent.

On the other hand, it is sharply and constantly differentiated from the latter by the very broad collar always well closed in front (and often behind) and by the black belly and flanks matching the breast. And since these two characters are, it seems, constant, this form is very distinct and easily separated from *Branta bernicla*, but nevertheless only as a variety. Some examples of the typical form, and also of the light-bellied variety (*B. bernicla glaucogaster*) also sometimes have the white patches on the sides of the neck meeting in front, but this is only as a rare exception, clearly, as it seems to me, pointing to the specific relationship of all three forms of brent. The completely isolated geographical distribution of *B. nigricans* alone sharply separates it from the two others.

Geographical Distribution

The range of the nemok is by no means difficult to work out. The Arctic zone from the Lena to the extreme east of the Asiatic shore and (passing over the islands in

[1] Although Taczanowski speaks of the more massive bill of this form, this is not borne out by the dimensions he gives, so that it is desirable to obtain accurate measurements of bills from freshly killed birds.

Bering Sea) the western Arctic portion of North America form the nesting-ground of this brent. Of its nidification to the west of the Lena there are as yet no indications.

This brent descends to winter along the eastern coast of the Asiatic continent and the adjacent islands to Japan, and along the western coast of North America to Lower California, sometimes even straying south to the Laysan Islands, and even Maui, where an example was procured in 1891.[1]

As a very rare straggler, it has been recorded from the eastern coast of North America (Long Island).

"The migration routes of the black-bellied brent in East Siberia," writes Maak, "as likewise its manner of life there, are entirely unknown, nor is there any wealth of information as to its habits in North America. From the statements of fowlers these birds appear about the Yakutsk with the breaking-up of the ice on the Lena, and as they fly very low on passage, especially towards evening, they are then massacred in large numbers.

"On the Lena, at the mouth of the Lunka, the first skein showed itself on May 13; and the arrival continued about five days. Farther inland from the Lena these geese occur very rarely, a fact confirmed by the Yakuts.

"On the Amur, in the mountains of the Khingan range, in 48° N. lat., I saw great flocks of this species from September 13 to 16, flying south; and also after noticed them on sandbanks, where they spent the night."

Mr. A. M. Nikolsky, who did not meet with this goose in Sakhalin, writes as follows:—"Personally I have not seen these geese on Sakhalin. T. S. Polyakov met them on the Ptichi Gory at the end of May southwards of Nituya, off the eastern coast of Sakhalin, on steep cliffs separated from the island by sea-water. Dobrotworski records this species from South Sakhalin. Micul says the nemok, as a bird of passage, occurs from spring to late autumn in South Sakhalin occasionally and in small numbers."[2]

In regard to North America we do not know very much. This bird has been observed by Macfarlane in abundance, breeding on the western shore of the Arctic Ocean; and some nests were found by him on inland fresh-water lakes and at the mouths of the Anderson, and many other nests were on the shore or on islands in Franklin Bay and other spots on the coast.

In some cases the nests were merely small depressions in the ground, lined with down; but in some the quantity of down was very great. The number of eggs in a clutch was generally 5, but in one nest there were 7, and in several 6.

This species nested in large numbers together with *Leucoblepharon hutchinsi* on the marshes; the natives gather the eggs at the end of June and bring them by whole boatfuls to Mikhalaska. Although Mr. Adams, who gives this information, says these eggs are not good eating and have a bitter and "fishy" taste, the Russians find them excellent.

The eggs of these geese (in North America) are of a dull ivory or greyish white colour, and from 70 to 75 mm. (= 2.75–2.90 in.) long, with diameter 48 to 49 mm. (= 1.80–1.85 in.).

The dimensions of six eggs from the Lena delta (Sogatyr), according to Mr. Göbel, are as follows:—

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[1] *Avifauna of Laysan and the Neighbouring Islands*, by the Hon. W. Rothschild, p. 271.

[2] In spite of this species occurring during the whole summer in South Sakhalin, it can hardly be supposed to nest there. A more probable assumption, in my opinion, is that only bachelors are met with there, or birds left behind during the flight north.

Max. breadth 51 mm. (= 2 in.), with 74 mm. length (= 2.91 in.) and 726 cgrm. weight.
Min. „ 47.5 „ (= 1.87 „), „ 75.5 „ „ (= 3.05 „) „ 654 „ „
Max. length 78.5 „ (= 3.09 „), „ 50.5 „ breadth (= 1.98 „) „ 666 „ „
Min. „ 68 „ (= 2.67 „), „ 48 „ „ (= 1.88 „) „ 627 „ „
Max. weight 744 cgrm., with 50 mm. (= 1.96 in.) breadth and 75 mm. (= 2.95 in.) length.
Min. „ 627 „ „ 48 „ (= 1.88 „) „ „ 68 mm. (= 2.67 „) „

Six eggs gave :—

Mean breadth 49.5 mm. (= 1.94 in.); max. breadth 57 mm. (= 2 in.); min. breadth 47.5 mm. (= 1.87 in.).
„ length 74 „ (= 2.91 „); „ length 78.5 (= 3.09 „); „ length 68 „ (= 2.67 „).
„ weight 690 cgrm.; „ weight 744 cgrm.; „ weight 627 cgrm.

As to the mode of life, habits, migration, call, etc., apparently no essential difference has been noted between this goose and *Branta bernicla*. Its chief food is the *Zostera*, but small molluscs are sometimes found in the stomach.

In conclusion, I cannot but dwell on the following observation of Professor Menzbier (*Ptitsy Rossii*, i. p. 725): "I think that, although the majority of brent-geese passing over European Russia are typical *Anser brenta*, yet *Anser nigricans* occurs among them, especially in Eastern Russia."

I absolutely do not know what to say to this, as I am unable to find any indication, either direct or indirect, of such an occurrence. Or can it be that the statements of sea-brent being occasionally killed in England with perfectly black bellies served as the grounds for the above hypothesis of the author of *Ptitsy Rossii*? It is, however, far from being yet proved that the black-bellied specimens sometimes met with in England had the corresponding broad white collars; in other words, that such examples really belonged to *nigricans*. If this were the fact, English ornithologists would probably have included this latter goose in the fauna of their country.

Genus *Leucoblepharon*, Baird (1858)

NECK long; bill and forehead black, as are feet. On head, only hind part of cheeks and aural regions white, but sometimes white patches extend to the throat, where they meet.

Easily distinguished from genus *Leucopareia*, Reichenbach, by the long neck and the absence of subterminal black stripes on feathering of body and wings.

HUTCHINS'S GOOSE

LEUCOBLEPHARON HUTCHINSI, RICHARDSON

Plate 19

English—*Hutchins's Goose*; *Hutchins's Canada Goose*; *Lesser Canada Goose*; *Small Grey Goose*; *Little Wild Goose*; *Hutchins's Barnacle Goose*; *Flight Goose*; *Mud Goose*; *Prairie Goose.*

Russian—*Kanadskaya malaya kazarka* and *Vostochno-sibirskaya kazarka* (Buturlin).

Anser canadensis, Pallas (*nec* Linn.), Zoogr. Ross.-As., ii. p. 230 (ins. Aleut.) (1811).
Anser hutchinsii, Sw. and Richardson, Faun. Bor. Amer., ii. p. 470 (1831); Audubon, Orn. Biogr., iii. p. 226, pl. 277 (1835); Seebohm, Birds Jap. Emp., p. 239 (1890).
Anser leucopareius, Brandt, Bull. Ac. St. Petersb., i. p. 37 (ins. Aleut.).
Anser (*Bernicla*) *leucopareius*, Brandt, Descr. et Icones. Anim. Ross.-Nov., Aves, i. p. 13, pl. ii. (1836).
Bernicla leucopareia, Gray, Genera of Birds, iii. p. 608 (1844).
Bernicla hutchinsii, Gray, Genera of Birds, iii. p. 608 (1844); Cass. U.S. Expl. Exped., Mamm. and Orn., p. 336 (1858); Baird, Birds of N. America, pp. 763, 766 (1858); Seebohm, Ibis, 1882, p. 369 (Jap.); Black. and Pryer, Trans. As. Soc. Japan, x. p. 96 (1882).
Bernicla (*Leucoblepharon*) *hutchinsii*, Baird, Birds of N. America, p. xlix. (1858).
Branta hutchinsii, Bonnaterre, Proc. Acad. Philad., 1870, p. 131.
Leucoblepharon hutchinsii, Gray, Hand-list of Birds, iii. p. 76 (1871).
Branta canadensis, var. *hutchinsii*, Coues, Key N. Amer. Birds, p. 284 (1872).
Anser (*Branta*) *canadensis*, var. *hutchinsii*, Ridgway, Ann. Lyc. N. York, x. p. 388 (1874).
Branta canadensis, e. *hutchinsii*, Coues, Birds of North-West, p. 554 (1874).
Branta hutchinsii, Salvadori, Cat. Birds Brit. Mus., xxvii. p. 114 (1895).
Anser hutchinsii, Buturlin, Dikie Gusi Ross. Imp. ("Psov. i Ruzh. Okh.," 1901); *id.*, separ., p. 6; *id.*, Sinopt. tabl. Okhotn. Pt. Ross. Imp., 1901, p. 41.
Bernicla leucopareia, Black. and Pryer, Ibis, 1878, p. 212 (Japonia).
Bernicla canadensis hutchinsii, Ridgway, Proc. U.S. Nat. Mus., iii. p. 203 (1880).
Anser (*Brenthus*) *hutchinsii*, Reichenow, Orn. Centr., 1882, p. 37.
Branta leucopareia, Stejneger, Proc. U.S. Nat. Mus., vi. p. 70 (1883).
Bernicla canadensis, y. *hutchinsii*, Baird and Ridgway, Water-Birds of N. America, i. pp. 455, etc.
Branta canadensis hutchinsii, Stejneger, Bull. U.S. Nat. Mus., No. 29, p. 147 (1885); Nelson, Nat. Hist. Coll. in Alaska, p. 84 (1887); Ridgway, Man. N. Amer. Birds, p. 117 (1887); Stejneger, Proc. U.S. Nat. Mus., x. p. 135 (Bering Isl.) (1887).

Adult Birds

Head and neck black; chin and throat white, and coalesced with latter a white patch on each side of head, ascending the cheek and terminating in more or less acute angle behind ear-coverts. Frequently stretching along throat, a longitudinal black streak of varying breadth, then dividing the white cheek-patches so that a separate white patch is formed on each side of head, as, for example, in a specimen from the Aleutian Islands, described and figured by Brandt[1] under the name of *Anser* (*Bernicla*) *leucopareius*.[2]

Back, upper wing-coverts, secondaries, tertiaries light brown, all feathers except on back with lighter edgings. Primaries and tail-feathers black-brown, latter normally 16, more seldom 14 in number, whereby this goose markedly and apparently constantly differs from *Leucoblepharon canadensis*, with 18 to 20 tail-feathers. Rump dark brown, upper and under tail-coverts, which are far from reaching the tips of the tail-feathers, pure white. Lower part of black neck (and mainly anteriorly) very light, almost white, and, in some examples, a sharply defined white ring surrounding whole base of neck. Breast and belly very light brown, gradually passing into white towards vent. Under-part of wings and axillaries dark brown. Bill black; legs and feet, with webs, dark leaden or almost black. Iris dark brown.

Plumage of other ages unknown.

This short description, which has been verified in several specimens in the Zoological Museum of the Imperial Academy of Science at St. Petersburg, and agrees with that of American authors, I find rather unsatisfactory and even enigmatic, for the following reason. The Canadian goose, the largest of this group, is divided by some American authorities into four sub-species (varieties), each of which is apparently again subject to considerable variations both in dimensions and colouring.

The following are the four sub-species, with their dimensions and distribution:—

1. *Leucoblepharon canadensis*, regarded as the type of the species, and sometimes attaining huge dimensions, possesses a very long bill, equal in length to the head,[3] and varies slightly in the intensity of the dark colouring of the plumage; it breeds in the northern part of United States and in Canada, descending to winter in Mexico.

Length	1041–1066 mm. (= 41–42 in.).
Wing	381–533 mm. (= 15.60–21 in.).
Culmen	39.3 = 68.5 mm. (= 1.55–2.70 in.).
Tarsus	62.2 = 93.9 mm. (= 2.75–3.70 in.).

Tail-feathers 18 to 20.

Typical form without longitudinal black streak on neck.

2. *Leucoblepharon canadensis hutchinsi*, of much smaller dimensions than preceding. Arctic and Subarctic North America, in winter throughout United States, mainly westward of the Alleghanies; north-east coast and adjacent islands of Siberia and Japan.

(?) Colouring—as in my description, but sometimes as in typical *Leucoblepharon canadensis*.

Length	655–863 mm. (= 25–34 in.).
Wing	373–449 mm. (= 14.75–17.75 in.).
Culmen	30.5–48.2 mm. (= 1.20–1.90 in.).
Tarsus	57.1–81.2 mm. (= 2.25–3.20 mm.).

Tail-feathers 16, *and more seldom* 14.

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[1] *Descr. et Icones Anim. Ross.-Nov.*, *Aves*, i. p. 13, Tab. 2 (1836).

[2] Whether this difference is connected with sex or age, or characterises a certain race, remains so far entirely unexplained.

[3] But, apparently, length of bill is far from constant, *i.e.* is not always in proportion to the other measurements.

3. *Leucoblepharon canadensis occidentalis*, somewhat larger than preceding, but with feebler bill (?). North-west littoral of North America, to north of Sitka; in winter descends to California. Usually on throat a black streak severing white of sides of band.

Length about	890 mm. (= about 35 in.).
Wing	411–487 mm. (= 16.25–18 in.).
Culmen	35.5–41.9 mm. (= 1.40–1.65 in.).
Tarsus	77–82.5 mm. (= 3.05–3.25 in.).

Tail-feathers 18 to 20.

4. *Leucoblepharon canadensis minimum* (*minima*). The smallest goose of the group. Pacific littoral of North America, breeding mainly on shores of Norton Bay and on lower waters of Yukon, but extending to Kotzebue Bay and Cape Barrow on the Arctic shore. In winter reaches south to California, and less often to upper part of Mississippi valley. Strays to Sandwich and Laysan Islands.

Length	584–635 mm. (23–25 in.).
Wing	345–368 mm. (= 13.60–14.50 in.).
Bill	24–29.2 mm. (= 0.95–1.15 in.).
Tarsus	61–70 mm. (= 2.40–2.75 in.).

Tail-feathers 14 to 16.

Along throat a longitudinal streak, separating the white patches of side of head, mostly present.

According to the statements of American authors, we find that the Pacific seaboard of North America is inhabited by four sub-species, or varieties, of the Canadian goose—a circumstance which is so far from agreeing (or, more exactly, is in contradiction) with my idea of a species that, notwithstanding all the authority of American ornithologists, and my great faith in Count Salvadori's knowledge, I am unable to accept it.

On the other hand, the lack of material renders it impossible for me to clear up this difficult question, the more so that this would require very extensive data from the most various points in the range of each of these forms. Count Salvadori, in his *Catalogue of the Birds in the British Museum* (vol. xxvii.), expresses himself as follows: "I have not been able to recognise more than two species—one (*B. canadensis*) extremely variable in size, and found nearly all over N. America; and a second, very much smaller and not very variable in size, confined to Alaska during the breeding season, but, according to American authors, extending to California in winter."

So far as I can make out, American ornithologists separate these four *forms* of the Canadian goose by the measurements of different parts of the body, and only partially by the colouring of the plumage, while it seems to me that in the given case the two characters together hardly suffice for the purpose. On the whole, the question as to the existence of the different forms of the Canadian goose seems to me as obscure and confused as was formerly that of the bean goose (*Melanonyx*), and, in a lesser degree, that of the grey geese (*Anser*).

If we recall that European ornithologists were in such doubt about these geese for more than a century, are we not justified in admitting the possibility of a like situation at present in regard to the geese of the genus *Leucoblepharon* in North America?

Were any definite characters, except dimensions and colouring of plumage, for each separate form of the above-mentioned geese given by American authors, our doubts as to the truth of their view would be considerably diminished. At the present moment, however,

I cannot discern in their descriptions any solid basis, except perhaps the number of tail-feathers—18 to 20 in *canadensis* and *occidentalis*, and 14 to 16 in *hutchinsi* and *minimum* (*minima*),—for the grouping of these geese. The question of bills remains quite open, and who knows whether the latter may not offer more substantial characters for the separation of the forms (or species?) of this group than those by which we have been hitherto guided?

At present I can do nothing but accept the determinations of these authors for the goose found by Stejneger on Bering Island, and by other investigators in Japan, and thus regard the Russian representative of the genus *Leucoblepharon* as the form called *hutchinsi*.

At my request Mr. Frohawk has figured an example of this form, and I feel sure that anyone, after a careful examination of this sketch, will at once see how far this type of the genus *Leucoblepharon* differs from the other black-footed geese of Europe and Asia, by its peculiar arrangement of colours.

To the information that this goose nests in the Komandor Group (Bering Island), and in the Kuriles, and that in winter it occurs in Japan (which was made known by Temminck as early as 1840, and confirmed by Blackiston and Pryer), I can add nothing. There are, in fact, no accounts of this goose in Russia.

As to North America, there is no small amount of information with regard to this goose, although it is difficult to make out to which form it refers. I may, however, observe that in their mode of life, their tendency to visit cultivated fields, and other habits, the geese of this group seem to differ markedly from the other black-footed geese, and perhaps only the red-breasted goose (from among the latter) shares with them the instinct of flying inland to feed.

Of three eggs of this species from the river Anderson, gathered on July 4, in the Zoological Museum of the St. Petersburg Academy, Mr. Göbel gives the following measurements:—

(*a*) breadth 57 mm. (= 2.24 in.); length 85 mm. (= 3.34 in.); weight 1464 cgrm.
(*b*) „ 56 „ (= 2.20 „); „ 86 „ (= 3.38 „); „ 1320 „
(*c*) „ 56 „ (= 2.20 „); „ 85.5 „ (= 3.36 „); „ 1380 „

or mean breadth, 56.3 mm. (= 2.21 in.); mean length 85.2 mm. (= 3.35 in.); mean weight 1388 cgrm.

I may here also cite the measurements and weights of two eggs also from the Anderson, distinguished as *canadensis*, which have been verified by Mr. Göbel:—

(*a*) breadth 56.5 mm. (= 2.22 in.); length 85 mm. (= 3.34 in.); weight 1368 cgrm.
(*b*) „ 54.5 „ (= 2.14 „); „ 86 „ (= 3.38 „); „ 1308 „

or mean breadth, 55.5 mm. (= 2.18 in.); mean length 85.5 mm. (= 3.36 in.); mean weight 1338 cgrm.

"These two geese form," observes Mr. Göbel, "in regard to the structure of the shell, a group somewhat remote from the black-footed goose. Their structure, although rather resembling the latter, is coarser, as they exhibit a certain colouring in consequence of soiling, not proper to the egg itself. In form they are prolonged; in *Leucoblepharon hutchinsi* the mean length is 28.9 mm. (= 1.13 in.) more than the mean breadth; in *canadensis* 30 mm. (= 1.18 in.). These eggs, therefore, are shaped like those of *Melanonyx brachyrhynchus*."

I may add the remark that, in view of the extremely similar dimensions and weights of the eggs of two supposed different geese, eggs gathered in the same river, where it is quite clear that only the western form (*hutchinsi*), and not the east American (*canadensis*), can be located, I am compelled to regard all those five eggs as belonging to one and the same species, and not to two different races of geese.

Genus *Leucopareia*, Reichenbach (1852)

Distinguished from *Branta* by tail-coverts not reaching the tips of the tail-feathers, the latter being 14, and not 16, and by white areas on head.

From *Rufibrenta* this genus differs by the unfeathered chin, the absence of rufous colouring from the plumage, and by the greater number of teeth (not less than 30) on each side of upper mandible.[1] From both genera *Leucopareia* is distinguished by the light bluish cinereous grey colouring of upper surface of body, with sub-terminal black crescents to feathers. From *Leucoblepharon* it differs by the shorter neck, white forehead, and the character of the plumage.

THE BARNACLE GOOSE

Leucopareia leucopsis, Bechstein

Plate 20

English—*Barnacle Goose*, *Barnacle* or *Bernacle*; *Wexford Bernacle*; *Hell-hounds.*
Russian—*Beloshchekaya kazarka*; *Srednyaya kazarka* (Lepekhin); *nemaya kazarka*, *malaya nemaya kazarka* and *nemoi gus* (Sabaneev); *varegui* (in Turnkhansk, *teste* Middendorff).
Samoyed—*Labu*[2] (in Kolguev, *teste* Trevor-Battye); *Dyoryánku* and *dyor* (in Taimyr, *teste* Middendorff).
Yakut—*Lyglyyà* (on Boganida, *teste* Middendorff).
Finnish—*Valkeanoski hanhi.*
German—*Nounengans*; *Muschelgans*; *Schottische Nordgans*; *Bernache*; *Baumgans.*
French—*La Nounette*; *Bernache nounette.*

Bernicla, Brisson, Orn., vi. p. 300 (1760).
Bernicla minor, Brisson, Orn., vi. p. 302 (1760) (juv.).
Anas bernicla (*partim*), Linn., Syst. Nat., i. p. 198 (1766).
Anas erythropus, Gmelin (*nec* Linn.), Syst. Nat., i. p. 512 (1788).
Anser erythropus, Bonnaterre (*nec* Linn.), Encyclop. Méthod, i. p. 120 (1790).
Anas leucopsis, Bechstein, Orn. Taschenb., ii. p. 424 (1803).
Anser leucopsis, Bechstein, Gem. Nat. Deutschl., 2 ed., iv. p. 921 (1809); Audubon, Orn. Biogr., iii. p. 609, pl. 296 (1835); Naumann, Vög. Deutschl., xi. p. 378, pl. 291 (1842); Kessler, Russk. Orn., p. 368 (1847); Menzbier, Ptitsy Rossii, i. p. 727 (1895); *id.*, Promysl. i Okhotn. Pt. Ross. i Kavk., p. 462, pl. 131; Middendorff, Reis. Sib., ii. 2, p. 228 (1851); Kholodkovsk. and Silantiev, Pt. Yevropy, p. 524 (1901); Czernay, Beitr. Faun. Chark. Gouvern. ("Bull. Soc. Mosc., 1850, p. 620); Deryugin, Orn. izsl. Pskovsk. gub., 1897; Buturlin, Tabl. opred. Plastinchatokl. ("Psov. i Ruzh. Okh.," 1901); *id.*, separ., p. 7;

[1] In *Rufibrenta* the number of teeth, so far as I can yet judge, must seldom exceed 16.
[2] The name, perhaps, is given on Kolguev also to the red-breasted *kazarka*, for which see Buturlin's notice at end of book.

id., Sinopt. tabl. Okhotn. Ptits. Ross. Imp., p. 41 (1901); Sabaneev, Ukazatel Kne. i St. Okhotn. i Zool. Sod., pp. 455-458 (1883); *id.*, "Zhurnal Okhoty," i. 1874, "Prolet gusei," with drawings.

Anser bernicla, Pallas. Zoogr. Ross.-Asiat., ii. p. 230 (1811).

Bernicla leucopsis, Boie, Isis, 1822, s. 563; Büchner, Ptitsy Spb. gub., p. 514 (1884); Trevor-Battye, Ice-bound on Kolguev, p. 425 (1895); Malmgren, "Ibis," 1869, p. 230; Sclater, Proc. Zool. Soc. London, 1869, p. 629; Pleske, Säuget, and Vög. Kola Hlbns. (Beitr. Kenntn. Russ. R., ix. p. 245) (1886); Russov, Ornis Esth., Lifl. et Curl., 1880, p. 169; Brandt, Cab. J. f. O., 1880, p. 247; Macpherson, History of Fowling, 1897, p. 221.

Bernicla erythropus, Stephens, Gen. Zool., xii. 2, p. 49 (1824).

Leucopareia leucopsis, Reichenbach, Avium Syst. Nat., p. ix. (1852).

Chenalopex leucopsis, Geibel, Thesaur. Orn., i. p. 372 (in Syn. *A. leucopsis*) (1872).

Branta leucopsis, Bannister, Proc. Acad. Philad., 1871, p. 131; Salvadori, Cat. Birds British Mus., xxvii. p. 117 (1895).

Anser (*Brenthus*) *leucopsis*, Reichenow, Orn. Centr., 1882, p. 37.

Anser canadensis, Lepekhin, Putesh., iii., Prib., p. 5, pl. 10 (srednyaya kazarka).

Adult Birds of Both Sexes

Forehead, cheeks, chin, and throat white, often with yellowish or rosy yellowish tint; streak on lobes, between bill and eyes, crown, nape and all neck black; upper part of back between scapula and rump black, latter with bluish reflection; upper tail-coverts white; breast and belly greyish white; vent and lower tail-coverts pure white; flanks and thighs white, with transverse grey bars; scapulars, upper wing-coverts, and tertiaries, light bluish grey, with sub-terminal blue-black crescents and very narrow white tips to feathers; primaries and secondaries, as well as tail-feathers (14), very dark, almost black. Under part of wing and axillaries light grey. Bill, legs, feet, and claws black. Iris dark brown. Female slightly smaller than gander, but identical in plumage.

Young Birds

On white areas of head an admixture of black or dark brown featherlets; feather-tips, scapulars, and upper wing-coverts, with rusty or rufous tintage. Flanks with broader and darker grey bars. This description, borrowed mostly from Count Salvadori, probably refers to birds of not less than three years, although for want of material I cannot positively affirm this. In younger birds sub-terminal black crescents in feathers of adults replaced by much wider black bars, giving whole surface of body darker colouring. It is very likely that in this respect the barnacle goose is subject to considerable individual variation.

Young Birds in First Plumage

White on head, with strong mixture of brown; colouring of head, neck, and breast tinged with brown below white tips; tail-feathers with greyish white tips. The black bill and feet have a reddish tinge.

Young in Down

Upper part of body dark grey, lower part whitish grey.

Dimensions of Adult Birds[1]

Total length	596–711	mm.	(= 23.50–28 in.).
Wing	378–429	„	(= 14.90–16.90 in.).
Culmen	28–36.3	„	(= 1.10–1.43 in.).
Tarsus	$63\frac{1}{2}$–76.2	„	(= 2.50–3 in.).

[1] These measurements hardly represent the limits, and on account of scantiness of material, are borrowed from various authors.

Number of teeth on each side of upper mandible not less than 30.

Weight, according to Mr. H. L. Popham, based on 55 individuals; maximum 5 lbs., minimum 2½, and average 4 lbs.[1]

Geographical Distribution

With regard to Russia scarcely anything is known in reference to the range of this species. Why Professor M. A. Menzbier denies the possibility of its breeding in the Taimyr peninsula, and hence its traverse of the Transural lakes, seems unintelligible. The fact that Middendorff did not personally meet with this goose in Siberia is, in any case, less indicative of its absence than are the Russian and native names of its presence in that country.

On the contrary, it seems to me that its Russian name in Turukhansk, *varegui* —the Yakut, *lyglyyá*—and Samoyed, *dyoryánku* or *dyor* in the Taimyr district, are undoubtedly in favour of its occurrence, and doubtless also of its nesting there; and once this is admitted, there are no grounds for questioning its occurrence on the Transural lakes, as stated by Mr. Sabaneev on the authority of natives of the Perm Government.

Accordingly, I am quite prepared to believe that the barnacle goose breeds in the Siberian tundra eastwards to the Taimyr peninsula. Another circumstance in favour of this opinion is that once in England a red-breasted bird was shot among a flock of barnacle geese.[2]

If we examine this question somewhat more closely we shall inevitably come to the conclusion that these two geese must somewhere nest in company, but from our knowledge of the breeding range of the red-breasted goose, we are driven to conclude that this can occur only in the western part of North Siberia. Otherwise, it would be impossible to explain the above-mentioned occurrence of red-breasted in a flock of barnacle geese. Of course this is no more than the logical result of the analysis of the facts, but it has, I think, a great share of probability. On the other hand, the circumstance that explorers of Northern Siberia have not met with this goose is, in my opinion, of no importance whatever. There is much that they have not yet ascertained about that country, and, indeed, we have no right to demand more than they have at present accomplished in the way of determining the local fauna, knowing how difficult it is to discover, note, and collect everything in a comparatively short time in regions so difficult, so vast, and so inaccessible. I repeat that I fully trust the statements of Pallas and the statements of Yakuts and Samoyeds as cited by Middendorff, that the barnacle goose is a member of the northern fauna, at least, of the more western part of Siberia. This question may therefore be regarded as still open, and in nowise as finally decided in the negative.

As regards the authenticity of the identified breeding-grounds of this goose in Russia, we may point to Novaia Zemlia and Kolguev, this species probably nesting in the latter area in comparatively very small numbers.

The migration routes, given by Professor Menzbier, include the region of the Varanger fjord, the littoral of the Baltic border, Lake Chud, the coast of the St. Petersburg Government, the southern seaboard of Finland, and the Aaland Islands, with rare visits to Poland and Pskov. To these I can add the Mezen, where on May 18, 1840, an adult male, now preserved in the Zoological Museum of the St. Petersburg Academy, was

[1] *The Field*, January 17, 1903, p. 2612.

[2] See notice of red-breasted goose.

obtained. Its label bears on one side "Filoppov," and on the other "von Baer." It is indeed probable that, apart from Poland and the Pskov Government, this goose has visited, and still visits (? on migration) many parts of European Russia, but that these visits have been and still remain unnoticed.

Although we have no other information with regard to the range of this goose in Russia, reference may be made to a somewhat strange statement by Lepekhin as to its occurrence in Archangel. Describing it as "srednyaya kazarka,"[1] or *Anser canadensis*, this writer proceeds to observe that "this goose, according to the statement of the famous Linné, breeds in Canada, whence it was given the name of the Canadian goose; but it is yearly to be seen in Archangel, and, in particular, on the lakes of Lapland, and on the tundras in Samoyediya, where it rears its young and affords no small part of the subsistence of the Samoyeds, who slaughter a great many of these birds with sticks on the shallow lakes in the moulting season, and after drying them in the sun, store them for future use."

Notwithstanding that Lepekhin confounded it with the Canadian goose, and perhaps partly also with the brent (*Branta bernicla*), he evidently knew the present species, since the figure he gives (*l.c.* Pl. 10) leaves no doubt on the subject. His statements are, in any case, worthy of attention, and the assertion as to its breeding on the tundras of "Samoyediya" should not be too hastily contradicted. Who, indeed, can affirm that Lepekhin was mistaken, and that we are really much better acquainted with the fauna of Lapland than was generally the case in his time?

But few authenticated breeding-grounds of this species are known outside Russia. It has, however, been found nesting in limited numbers in the Lofoden Islands (Professor Collett); and it also breeds in the southern part of Greenland, where it is a regular bird of passage, as a specimen of the young in down was brought thence to the Copenhagen Museum. In Iceland and Spitzbergen it undoubtedly nests, as it probably also does in Franz-Josef Land; but, after passing through the southern part of Greenland, it is at present entirely unknown to what part of the north it goes to breed.

The barnacle goose winters in some parts of the Baltic, on the coasts of Denmark, Holland, Northern France, and Great Britain; but it seldom visits the interior of the West of Europe, or even Southern Europe, although instances are known of its straying into Spain. On the Atlantic coast of North America this goose only occasionally occurs.

If our information with regard to the geographical distribution of this species be fragmentary and incomplete, we are still less acquainted with its life-history. Professor Menzbier, for instance, writes that, "We know hardly anything of the manner of life of the barnacle goose. Like many other geese it is a sociable bird, and an excellent flyer and runner; its food, which, like that of the brent, consists of water-weeds, crustaceans, and aquatic insects, is obtained either on the sea-shores or the margins of lakes. About July 16 on Spitzbergen these birds are in full moult, when, like the brent, they are quite incapable of flight and seek refuge by running." Professor Collett, who has done so much for the zoology of Norway, states that "a pair of barnacle geese bred for several years in the Lofoden Islands, where they constructed a nest of waterweeds and moss, which was placed either on a narrow shelf of cliff or under the shelter of a rocky projection. The eggs in a clutch are five; in external appearance they are indistinguishable from those of the brent."

[1] *Puteshestvie*, iii. Append. p. 5, pl. 10.

The following are the only dimensions I know of the eggs of this species :—

Width	60.4 mm. (= 2.38 in.).
Length	94.2 mm. (= 3.71 in.),

and these are extraordinarily large for so small a goose.

In captivity these geese become very tame, and will not only breed, but in exceptional cases will pair with other species. Count Salvadori, for instance, states that he saw in one of the London parks a cross between a barnacle and some other species of goose, which had a great development of the white on its head and yellowish feet.

Probably the majority of my readers are acquainted with the legend of the origin of this goose from the barnacle (*Lepas anatifera*), so common on the western shores of Europe. This myth, of very ancient origin, was taken for fact even in the sixteenth century by such well-known writers as Aldrovandi, Gessner, Olaus Magnus, etc., and strange to say, there are places where the coast population, especially fishermen, still does not doubt its truth. The essence of this story, which has many variations, is as follows :—

In one of the Orkneys, namely, Pomona, on the very shore stands a wondrous tree, at the ends of whose branches grow shells, which at a certain time of year, on falling into the sea, change into barnacle geese. The name of these geese—Bernacle or Bernicle—is identical with that of the shells; but the latter are not molluscs at all, but belong to crustaceans of the order Cirripedia, family *Lepadidæ*, and species *Lepas anatifera* of Linné. The crustaceans fasten their calcareous dwellings to various submerged objects, and in particular to piles and planks lying long in the water. This myth refers generally not only to the goose in question, but locally also to the brent and even the scoter. Sir R. Payne-Gallwey writes:[1] "Absurd to narrate, the old story of brent geese being hatched from barnacles on drift timber is universally current on the coast of Ireland to this day. Nothing will dissuade the fishermen and fowlers; they will vow they have seen the occurrence themselves, or that their friends have."

The same author holds that the flesh of this goose is not edible, while according to others it is delicious. Of course everything depends on the food the birds last fed on; and their stomachs have been found to contain various vegetable substances, such as *Poa distans*, *Carex bulbosus*, *Trifolium repens*, *Ranunculus*, etc. It is, however, also known that various kinds of shellfish occasionally serve as their chief food, and then, of course, their flesh is fishy.

On the waters round the coasts of Holland, the north of France, and the north-west of Great Britain, the barnacle goose usually arrives about the middle of October; sometimes, if the weather be severe, a little earlier; it leaves in March. On the waters of Schleswig-Holstein this species is very abundant in winter, keeping mostly near the oyster-beds. On the eastern coasts of England it is a rare visitor, appearing sometimes after an absence of scores of years. In Ireland it is much more numerous than the brent.

Although a completely marine bird, the barnacle goose often flies to pasture, if the latter be near the sea, which the brent apparently never does. With the latter it is not friendly, and even seems to avoid its company; in localities where the two live together, the barnacle keeps as far aloof as possible, never mingling with the flocks of brent.

[1] *The Fowler in Ireland*, p. 159 (1882).

Genus *Cygnopsis*, Brandt (1836)

Bill longer than head, entirely black, depressed, short at the point, and somewhat swollen at the forehead; base of upper mandible projecting into feathering of forehead in an arch.[1] Nails of both mandibles very large, with their outer edges (owing to the number of parallel transverse furrows) serrated like the milling on a coin to a much greater extent than in other geese. Tarsus considerably shorter than median digit without claw (usually by more than half-inch). Tail-feathers 18. Legs and feet orange.

THE SWAN-GOOSE

Cygnopsis cygnoides, Linn.

Plate 21

English—*Chinese Goose*; *Swan Goose.*

Russian—*Sukhonós* (Transbaikalia); *kaury gus* (ditto, with Daurian frontier); *gus-lobed* (Przewalski); *kitaisky gus* (mainly domesticated).

Mongol—*Khongór galun* (*teste* Pallas, meaning swan-goose; but *teste* Radde, who writes *Khongor-golun*, it means yellow-brown goose. The domesticated birds are called by the Mongols *mangut-galn*, *i.e.* Devil's goose, or ghost goose, *teste* Pallas).

Gilyak—*Yt* and *Nyoni* (Schrenck).

Mangun and Gold—*Nyunya* (Schrenck).

Orochon—*Nyunyaki* (Schrenck).

German—*Schwanengans*; *Trompetergans*; *Hockergans*; *Russische Gans*; *Sibirische Gans*; *Chinesische Gans*; *Japanische Gans*: *Guinea Gans* (evidently the majority of these names refer to domesticated birds).

French—*Oie de Guinée.*

Anas cygnoides, Linn., Fauna Suec. p. 108 (1746); *id.*, Syst. Nat., i. p. 194 (1766).
Anser muscoviticus, Brisson, Orn., iv. p. 278 (1760).
Anser guineensis, Brisson, *l.c.*, p. 280.
Anser cygnoides, Pallas, "Voyages," iv. p. 144, App., p. 672; *id.*, Zoogr. Ross.-Asiat., ii. p. 218, pl. lxiv. (1811); Eyton, Mon. Anat., pl. 5 (skeleton), 1838; Temminck and Schlegel, Faun. Jap., Aves, p. 125 (1850); Maak, Amur, App. p. 143 (1859); Radde, Beitr. Kennt. Russ. R., xxxiii. p. 210 (1861); Przewalski, Put. Uss. Kr., 1870, pp. 182, 183, etc.; *id.*, Mong. i Str. Tang., ii. p. 151 (1876); Sclater, Proc. Zool. Soc. London,

[1] In all the other Palæarctic geese we see the opposite condition; the feathering of the forehead projects in an arch or even an angle into the base of the upper mandible.

1880, p. 501 ; Seebohm, Birds of Japan. Empire, p. 285 (1890); Buturlin, Dikie Gusi R. I. (1901), p. 21 ; Sabaneev, Ukaz. Kn. i St. Okhotrich. i Zool. Sod., pp. 455-458 (1883); Severtsov, Vert. i Goriz. Raspr. Turk. Zh., p. 70 (1873); Bogdanov, M. N., Pt. Zver. Povolzh. (1871), p. 148 ; Buturlin, Sinop. tabl. Okh. Pt. R. I. (1901), p. 40 ; Macpherson, History of Fowling, p. 226, 1897.

Anas orientalis, Gmelin, Syst. Nat., i. p. 503 (1788).

Cygnus sinensis, Stephens, Gen. Zool., xii. 2, p. 22, pl. 40 (1824).

Cygnopsis cygnoides, Brandt, Bull. Ac. Sc. Pét., 1836, i. p. 37 ; *id.*, Decr. et Icones An. Ros. Nov., Aves, i. p. 5 (1836); Taczanowski, Faune Orn. Sib. Or., p. 1100 (1893); *id.*, Proc. Zool. Soc. London, 1888, p. 46 ; Stejneger, Proc. U.S. Nat. Mus., x. p. 136 (Bering Island); Salvadori, Cat. Birds Brit. Mus., xxvii. p. 107 (1895); Oates, Man. Game Birds of India, p. 11 (1899).

Anser cygnoides ferus, Temminck and Schlegel, Fauna Jap., Aves, pl. 81 (1850).

Cygnopsis ferus, Reichenbach, Syst. Av., iv., Novit. Natat., pl. ccccliii. fig. 2773 (1850).

Cygnopsis guineensis, Reichenbach, Av. Syst. Nat., p. x. (1852).

Cygnopsis cygnoides a. *australis*, Bonaparte, Compt.-Rendus, xliii., p. 648 (1856).

Anser (*Cygnopses*) *cygnoidis*, Schrenck, Vög. Amur-L., p. 457, pl. xv. (1860); Radde, Reis. O.-Sib., ii. p. 350 (1863).

Anser sinensis, Sclater, Proc. Zool. Soc. London, 1863, p. 234.

Anser grandis, Finsch (*nec* Gmel.), Ibis, 1877, p. 53.

Cycnopsis cycnoides, Heine and Reichenow, Mus. Hein. Orn., p. 342 (1890).

Adult Male

On feathering of head, along base of upper mandible, runs a narrow white streak, mostly with strong admixture of bright rusty, and a similar white (with rusty) patch occupies apical part of feathering of chin, which falls short by more than an inch of base of nail of lower mandible. From base of upper mandible over lores and across eye, passing below it and over ear-coverts, extends a wash of reddish clayey brown, occupying whole crown and nape, and gradually mingling with whitish of cheeks; a streak of same colour passes behind base of lower mandible; chin rather lighter. Nape and posterior surface of neck reddish brown (rufous); throat, cheeks, and front surface and sides of neck whitish; breast grey buffish white, the feathers often with lighter edgings and a rusty tinge. Back grey-brown with greyish white edges to feathers, giving its whole surface a scaly or wavy appearance; lower part of body dingy white. Flanks like back, that is grey-brown, with light grey (or whitish) undulations, due to the light margins of the feathers. Vent and lower tail-coverts white; rump greyish; upper and lateral tail-coverts white; tail grey-brown with broad white edges and tips. Wing generally ashen grey; upper coverts, lying nearest edge of wing, almost pure ashen grey, with very feeble admixture of brownish, but latter colour more definite nearer back. The lesser and median coverts have lighter whitish edgings; greater wing-coverts with white edgings; alula pure ashen grey.

Outer primary flight-feathers, at middle of their length, with ashen-grey outer webs; the inner darker grey; web towards tip of feather becoming brown-black; successive primaries gradually losing the grey and becoming brown-black; brown secondaries and tertiaries with whitish edgings, and posterior tertiaries gradually becoming lighter and of the same colour as the feathers of the back and scapulæ. Shafts of all flight-feathers, as in other geese, white, with the exception of the tips, which are of the same colour as the webs.

Under part of wing and axillaries dark ashen grey. Bill black, glossy, particularly nail of upper mandible. Beneath the slightly swollen base of upper mandible, projecting arch-wise into the plumage of the forehead, lies a transverse straight furrow (or depression), very like that in swans. Occasionally in dry skins this is slightly swollen and wrinkled trans-versely. Number of teeth on each side of upper mandible varying from 28 to 30; but with larger materials the limits may prove wider. Particularly striking is the fact that between the mental angle and the posterior edge of the nail of the lower mandible, for a length of about

38 mm. (= 1.50 in.), the intermandibular space is occupied by very hard smooth skin, having the appearance of a black horny plate. It would be very desirable to know what this skin is like in the living bird, and whether it is really horn. Generally the structure of the bill in the swan-goose is nearer that of swans than is that of other geese. Legs and feet orange, brighter or lighter in tint. Iris red-brown.

Total length	875–915 mm. (= 34.4–36 in.).
Wing	445–460 mm. (= 17.50–18.10 in.).
Tail	140–152 mm. (= 5.50–5.90 in.).
Culmen	87–98 mm. (= 3.42–3.80 in.).
Bill from gape	75–83 mm. (= 2.95–3.60 in.).
Tarsus	80–82 mm. (= 3.14–3.22 in.).
Median digit with claw	80–90 mm. (= 3.14–3.54 in.).
Breadth of bill at base	27–30 mm. (= 1–1.18 in.).

Adult Female

Generally resembling male, but inferior in size. Swelling on base of upper mandible absent, and white feathering along base of bill considerably narrower, and at places even interrupted. White patch on apex of chin almost non-existent. I have, however, seen too few females to be sure that all these characters are constant. For this reason, and because I may possibly have mistaken young males for females, I prefer to give the dimensions of females according to Messrs. Radde and Schrenck.

Length	31½″
Wing	15″ 10‴
Tail	4″ 10‴
Culmen	2″ 10‴
Depth of bill at base	1″ 3‴
Tarsus	2″ 9‴
Median digit	2″ 11‴
Claw	6‴

(Radde.)

Wing	16″ 6‴
Tail	5″ 7‴
Bill	3″ 3‴
Depth of bill at base	1″ 2‴
Breadth of bill at base	9‴
Tarsus	2″ 11‴
Median digit	2″ 10½‴
Claw	5½‴

(Schrenck.)

Young Bird (in First Plumage)[1]

Bill smaller; white of cheeks and throat without admixture of brownish. A white (or rusty white) streak on feathering at base of bill absent. Feet in living bird dingy yellow with blackish webs.

Wing	13″ 3‴
Tail	4″ 3‴
Culmen	2″ 6‴
Depth of bill at base	1″ 1‴
Breadth of bill at base	8‴
Tarsus	2″ 9‴
Median digit without claw	2″ 9‴
Claw of median digit	5‴

(Schrenck.)

The young in down appear to be unknown.

[1] Schrenck, *Vög. Amur.-L.*, pl. xv. fig. 2.

Geographical Distribution

So far as known, comparatively simple; the limits on the west being the rivers Obi and Tobol, and on the east Kamchatka, and the Komandor and Kuril Islands.

The whole of Siberia within these limits, with the exception, of course, of a few spots unsuitable for nesting, must be regarded as the home of this goose—in other words, its breeding-grounds; but the northern boundary of its range in Siberia is not yet ascertained, there being no trustworthy data for the purpose. It may, however, be surmised with great probability that it passes far below the Arctic Circle, and nowhere reaches the same. From the shore of the Okhotsk Sea the species has not been recorded (as already observed by Schrenck), and the same holds good for Sakhalin, but this does not prove that it does not exist there, although it can hardly breed on Sakhalin on account of the apparent absence of suitable spots. The chief centre of distribution of the swan-goose must be considered the whole region surrounding Lake Baikal, Transbaikalia, and all Northern Mongolia, as well as the whole course of the Amur, the Argun, and the Ussuri district. The bird migrates to winter in the Celestial Empire, where at that season, according to the Abbé David, native fowlers furnish the markets of Shanghai and Tian-Tsin with these geese. It also winters in Korea and Japan, where it is a resident. According to the same authority, the swan-goose leaves China for the north very early.

In regard to its distribution in Central Asia, we have known from the time of Pallas that it is found in the Altai Mountains, that is, on the Charysh, Koksun, and Teletsk Lakes; but how far south its limit reaches is not yet ascertained. Przewalski met with broods of these geese and moulting old birds in the valley of the Yellow River on Tsaidamin-Nor; but in Tsaidam, on Koko-Nor, he says that the species does not occur. On the other hand, during the journey from Ala-shan to Urga, through the Gobi, his expedition frequently met with flocks migrating in August.

In Turkestan the swan-goose occurs only as a casual visitor. Severtsov mentions that it was obtained by Karelin from Semirechiya, and he himself saw geese which he took for this species in May 1864, in the steppe between Verny and Kastek at a height of about 3000 feet, near the backwaters of some mountain streams.[1] As to the suggestion made by Mr. Bogdanov (*Ptitsy i zveri Povolzhya*), "that there is nothing impossible in swan-geese occurring on passage on the Volga," this seems incredible, as in such case this goose should winter at least somewhere in Europe, of which we have no evidence. Its casual occurrence on the Volga and farther west is of course possible, and I even fully believe, as appears from the notice of *Philacte canadica*, that the latter has been twice obtained on that river, but between such casual visits and regular migration the difference is very great. As I cannot give a more accurate definition of the range in Asia, I will now quote such observations as furnish the most valuable information with regard to the habits of this goose. Dr. Radde, for example, writes as follows:[2] "On Lake Baikal swan-geese keep only to the mouths of the larger streams falling into the lake, and I never met them on the steep shores of Lake Baikal itself. Moreover, these geese are not plentiful there in winter, but in August 1855, of an evening, their loud, resonant notes might be clearly heard in the delta of the Angara, overpowering those of the other water-fowl. In summer these geese are by no means uncommon,

[1] I quite admit this goose *may* appear in winter in Turkestan, but I cannot but treat Severtsov's determinations with some scepticism, as he identified *Anser obscurus* from that region.

[2] *Sib. Reis.*, ii. p. 350, etc.

and are sometimes caught during the moult or as quite young goslings, and tamed. I often met with them in this domesticated state, especially in the lower part of the valley of the Selenga. On Tarei-Nor, in 1856, the first swan-geese showed themselves on April 3. On the 18th, on Lake Ildza there were already many eggs, although by no means all the geese bred there. Many of them kept in flocks during the whole summer. On the Middle Amur the vanguard appeared earlier than in Mongolia, namely on March 28, 1858. On April 4, in the Bureisk Hills on the Uril, geese were met with already paired. On the Tunkinsk plateau in the spring of 1858 they appeared much later; although in that year all the birds at that great elevation were late in their arrival, and the swan-geese, which are generally not numerous, did not put in an appearance till the end of April. In previous years, according to the natives, they were more common in this locality. On May 27, 1856, the natives brought me swan-geese which showed the first signs of moulting; and by the first week of August the moulting was completed on Tarei-Nor. By August 12 the geese had already concentrated in large camps, and their noise and cries were then unceasing. They rested by preference on salt pools, over which they hovered from time to time. On September 2 the majority of the swan-geese left Tarei-Nor, on the 4th there were but few remaining, and by the 7th all were gone. In the Burei Hills I noted that the first left on August 28, and the last on September 2. On the frontier of Mongolia the first eggs were found on April 15; these being always of less size than those of the grey-lags which nest there. The figure given by Thienemann agrees with the smallest example among those brought home by myself. Usually the eggs are pure white, but some are stained all over with grey dirt which cannot be washed off. The structure of the shell is subject to the same variations as in the eggs of the grey-lag. They are often coarse-grained, but sometimes the grains are less prominent and less close together, while at other times their surface is comparatively smooth."

This description of the eggs of the swan-goose does not agree with one by Mr. Göbel,[1] based on 20 examples, in which "the structure of the shell of the egg of the swan-goose" is said to be "smooth and shows a crystalline character, in which it approaches that of the shell of the eggs of Bewick's swan."

According to the same observer, these dimensions are as follows:—

Max. breadth	59	mm.	(= 2.32 in.),	with	85.5	mm.	length	(= 3.28 in.),	and	1512	cgrm.	weight	(Sidemi).
„ „	59	„	(= 2.32 „),	„	81	„	„	(= 3.18 „),	„	1512	„	„	„
Min.[2] „	53	„	(= 2.08 „),	„	76	„	„	(= 2.99 „),	„	?	„	„	(Kulussutai).
Max. length	89.5	„	(= 3.52 „),	„	58	„	breadth	(= 2.28 „),	„	1572	„	„	(Sidemi).
Min. „	76	„	(= 2.99 „),	„	53.5	„	„	(= 2.10 „),	„	1176	„	„	(Kulussutai).
Max. weight	1590	cgrm.,		„	56	„	„	(= 2.20 „),	„	84	mm.	length	(= 3.30 in.).
Min. „	1176	„		„	53.5	„	„	(= 2.10 „),	„	76	„	„	(= 2.99 „).

Mean breadth 56.6 mm. (= 2.22 in.); max. breadth 59 mm. (= 2.32 in.); min. breadth 53 mm. (= 2.08 in.).
„ length 81.6 „ (= 3.21 „); „ length 82.5 „ (= 3.24 „); „ length 76 „ (= 2.99 „).
„ weight 1423 cgrm.; „ weight 1590 cgrm.; „ weight 1176 cgrm.

Przewalski writes concerning this goose as follows:—[3]

"On the lakes and swamps of the valley of the Lefu, of all the geese the one

[1] Mistakes in the determination of eggs are very frequent, especially if the eggs are supplied by natives, so that it is more than probable that Dr. Radde's description refers partly to eggs of other species.

[2] In one account we find the diameter less, namely = 51 mm. (= 2 in.), but it is very probable that the variations in this respect will prove greater with larger material.

[3] *Putesh. v Ussur. Kraye*, 1870, p. 220.

most frequently met with is the swan-goose, whose broods I came upon from the beginning of June. There are usually from 4 to 6 goslings. The two parents always keep with them, and sometimes two or three broods will unite, when the number of pairs of old birds is equal to that of the combined broods.

"If surprised on an open spot, for example a river or lake, the old birds as a rule fly off, while the young ones try to save themselves by diving. If, however, the brood succeeds in time in getting into cover, they effect their retreat on foot, while if pursued by a dog, the old birds, which take to wing only in extremity, like ducks sham being wounded and unable to fly, so as to draw the attention of the enemy to themselves. The young birds meanwhile hide in convenient nooks, where they lie so close that usually they do not allow themselves to be taken either by the dog or the sportsman, even when the latter has noticed their place of concealment."

Again, in his *Mongoliya i strana Tangutov*, ii. p. 151, we find the same traveller observing: "Met with these geese in small numbers in the beginning of April on Dalai-Nor"; while still later he writes that "on Lake Khanka *Anser cygnoides* appears in great numbers on spring migration, which is always rapid in the first third of April. Ordinarily these geese keep in flocks of from 20 to 40 individuals. On the wing they often form a wedge, within which ducks of various kinds frequently find room."

In the beginning of June Colonel Przewalski found the young birds not larger than mallards. Of the curiosity of the swan-goose this traveller writes as follows: "On the whole, this species is not very cautious, but extremely curious. Having noticed a dog or fowler crouching in the grass, a passing pair (but not a flock) will almost always fly to the spot and get under fire."

Messrs. Dybowski and Godlewski found these geese nesting in great numbers in Dauria along the Argun, where they made their nests on the steppe among grass, first making a slight hollow in the ground, and then lining them with down. The female sits very tight on her eggs, and leaves them unwillingly. As soon as the goslings go out on a river, they join those of other broods; the gander is always with his family, while the young ones are growing up, till they are fledged. In moulting, the adult males lose all their flight-feathers at once.[1] A flock in case of danger rushes to the river, where all its members swim at first, but having gained a certain distance, immerse themselves in the water, leaving only their heads above, and then strive to return to the shore, diving below the surface in the more dangerous places.

According to Godlewski, the migration season is the same as for other geese. At this time all the geese keep to open sandy shores, and never allow any one to approach. The natives take them in pits sunk in the ground, which are wide enough for the birds to fall into, and deep enough to be completely concealed. They are slightly covered with straw. The geese, when wandering about in such spots and getting on to the pits, usually raise their wings, but not finding any support for their feet, fall through, and are then unable to escape.

Here it may be remarked that I cannot in the least understand why Brandt, who established the genus *Cygnopsis* for this species, included therein the Canadian goose (*Leucoblepharon canadensis*); there being no reason for bringing these widely different

[1] Of course; as also the females, like all other geese, swans, ducks, and flamingoes.

birds together. The classification of birds, and of animals generally, still contains, however, much that is quite unintelligible.

The swan-goose, under the name of the Chinese goose, is very widely spread in the domesticated state, and is just as tame in this state as the ordinary domesticated grey goose. Externally the swan-goose shows, however, a considerable difference in the structure of the bill, the slight swelling at the base of the bill in the wild bird being converted in the tame breed into a large round tubercle, of such a size that it quite changes the whole outward appearance of the head, while at the same time the bill becomes shorter and thicker. Pallas supposed that this development might be due to crossing with the mute swan, but it is hardly needful to have recourse to such a hypothesis, as apparently the rudiment of a gland in the wild swan-goose, under the influence of food and a different mode of life, assumes abnormally large proportions. It is also a curious fact that in the domesticated birds, which retain more or less the colour of their wild ancestors, the bill remains black, while in the white breed the bill becomes red. The tame breed of this species considerably exceeds the wild form in size, being sometimes of very large size and weight. I think there is little doubt that it was large birds of this type, with the colouring of their wild congeners,—perhaps a cross between wild and large tame birds,—that were noticed by Gmelin and then described by Pallas under the name of *Anser grandis*, as it seems impossible to make this description fit any other known species of goose.

APPENDICES

I

Mr. G. F. Göbel on the Eggs of Russian Geese

This article, kindly placed at the disposal of the author of the present work by the well-known zoologist and oölogist, Mr. G. F. Göbel, affords the only satisfactory basis for further oölogical investigations in the sub-family *Anserinæ*, and on this account presents great interest, so that its publication will, I am confident, be acceptable to all ornithologists. I have made no other change than replacing the original nomenclature by that adopted in the body of this work.

"The colour of the eggs of all kinds of geese is white, but the shell of some, especially those that are coarse-grained,[1] easily acquires a dingy yellow or grey colouring, probably from the lining of the nest, which becomes damp from the moisture remaining on the feathers of the brooding goose. This colour sinks so deep into the pores of the shell that it cannot by any means be washed off I have never yet seen a pure white egg of *Melanonyx arvensis*, whose nest is placed on the tundra bogs and near the woody lakes of Lapland. It is always covered with a yellowish layer, while the eggs of *Melanonyx segetum*, which builds its nest on dry tussocks near the lakes in Novaia Zemlia, are only by way of exception stained throughout yellow, most of them having only yellow blotches, while some are quite white. The eggs of *M. brachyrhynchus* from Spitzbergen, judging from two clutches brought thence by Mr. A. A. Byalynitsky-Birulei, assume a grey tinge. I accordingly suppose that the water along the shores of the Lapland and Novaia Zemlia lakes must be stained yellow (more often in the former than in the latter country), owing to a peaty or ferruginous soil, which is wanting in the lakes of Spitzbergen, in the breeding-places of *M. brachyrhynchus*.[2]

On even a cursory inspection, the eggs of the bean-geese[3] are easy to distinguish from those of other groups by the very coarse grain of their shell; their surface being extremely uneven. In respect of the coarseness (roughness) or smoothness of the structure of the shell, the eggs of the geese may be placed in the following order, beginning with the roughest: *Melanonyx arvensis*, *M. segetum*, *M. brachyrhynchus*, *Chen hyperboreus*, *Anser albifrons*, *A. gambeli*, *A. anser*, *Eulabeia indica*, *Cygnopsis cygnoides*, *Branta bernicla*, *B. nigricans*, and *Rufibrenta ruficollis*.

As I have not to hand authenticated eggs of other species, I cannot give their characteristics; but there is good reason to believe that the structure of the shell of those of *A. finmarchicus* resembles that of *A. albifrons* and *A. gambeli*. Of *A. finmarchicus* I have had in my hands only one authenticated clutch, which, unfortunately, in descending a hill was broken. None of the eggs which have been sent me, inclusive of those from Schlüter, proved to belong to *A. finmarchicus*, but all pertained to other kinds of geese. The structure of the shell of *M. arvensis sibiricus* and *M. segetum serrirostris*[4] must be like that of other bean-geese.

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[1] Mr. Göbel's MS., although written in Russian, has the expression *das korn*.

[2] All these hypotheses are very probable, but so far as I know at present, *M. brachyrhynchus* nests (on Spitzbergen) on rocky cliffs, towering above the sea and not near lakes, which, however, in no way militates against our oölogist's supposition in regard to the colouring of the eggs.

[3] *i.e.* geese which I in the present work put under Buturlin's genus *Melanonyx*.

[4] And perhaps a third—*M. mentalis*, Oates, also nesting in Siberia.

In the Zoological Museum of the Academy of Science at St. Petersburg are three eggs of a large goose from Eastern Siberia, undoubtedly belonging to one of these two species,[1] but to which I am, of course, unable to say—although, probably, to the larger of the two, since these eggs are very large and, although of the same size, are comparatively much lighter than those of *A. anser*.

The structure of the shell of eggs of species akin to *Anser* or *Eulabeia indica, Chen hyperboreus, Cygnopsis cygnoides*, and the group of black-legged species must, I think, be like that of the aforesaid groups. The grain of the shell in these groups may be characterised somewhat as follows (seen under a glass magnifying six times) :—

(1) The grain of the shell in the eggs of the large bean-geese (*Melanonyx*) shows conspicuous elevations, surrounded and severed from each other by wide zones, or coronæ, of very irregular outline, as it were deeply eroded out of the shell.

(2) The grain of the shell in the white-fronted species produces the impression, when looked at with the naked eye, of rather coarse marble. Under the glass, the surface, which seemed fairly smooth, is seen, however, to consist of a mass of elevations thickly crowded on each other.

(3) The grain of the shell of the eggs of the snow-geese (*Chen*) resembles that of the white-fronted geese, but the elevations are more noticeable and do not stand so close together. There is accordingly sufficient space between them to permit of their becoming soiled, as may be seen in the egg belonging to the Zoological Museum of the Imperial Academy of Science at St. Petersburg.

(4) The grain of the shell in the eggs of the grey-lag (*Anser anser*) looks as if an originally very coarse shell had been subjected to careless polishing ; traces of the eroded portions remaining on the shell in the shape of short serrated lines, formed by long scars, as if in the depressions between them something like white powder had been left.

(5) The grain of the shell in the eggs of the swan-geese (*Cygnopsis*) is smooth and of a crystalline character. It approaches in granulation the shells of Bewick's swan.

(6) The grain of the shell in the eggs of the group of black-legged geese is exceedingly smooth, with hardly perceptible pores. It approaches that of the shells of ducks' eggs.

I fully recognise that it is impossible to describe more accurately the structure of the shell, for the simple reason that it is difficult to find descriptive terms commonly intelligible ; and I therefore confine myself to these general characters which afford a starting-point in the determination of goose-eggs. If, in doing so, I use expressions of a somewhat unscientific character, I hope I shall not be called to account. So-called scientific descriptions of the structure of the shell (when such are given) have never enabled me to reproduce an even approximate picture of the pattern on the surface of the shell, with the exception of those of old Thienemann, which exist, unfortunately, only in the shape of separate fragments for a few groups of birds.

As great confusion would have been avoided in the goose-question if later ornithologists had availed themselves of the descriptions of the species in the works of Naumann, which for some reason remained for a long time in complete neglect, so oölogy would have made great strides and not have still remained in its infancy if ornithologists had made use of the foundation so strongly laid by Thienemann, who, three-quarters of a century ago, divined, in his strictly scientific studies of eggs, that the chief characters for the true determination are included in the structure of the shell, *i.e.* in its grain and in the weight of the egg, and by no means only in colouring and dimensions. The last character is indeed almost devoid of importance, since, notwithstanding its considerable variation, the length of the egg with the diameter constant exerts but very little influence on the weight.

Unfortunately, a working knowledge of the structure of the grain of the shell is greatly hindered by

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[1] In view of the confusion between *M. arvensis sibiricus* and the large *M. segetum serrirostris* and, finally, *M. mentalis*, it is impossible as yet to say anything positive ; but owing to the size of the eggs, and especially the abundance in Siberia of *M. arvensis sibiricus*, it must be supposed that the eggs in the St. Petersburg Zoological Museum belong to this species.—AUTHOR.

the impossibility of exact description. Only, indeed, by means of micro-photography would it be possible to render the descriptions intelligible to oölogists other than specialists.

As I have said, almost imperceptible differences of structure in the shells of the eggs of closely related birds cannot be expressed by words alone. To describe the characters of the eggs of a whole group (genus) to a certain extent is indeed possible, but in describing a separate species one has to be satisfied in the majority of cases with a remark like "the egg of this species, while possessing all the characters of the group, has a coarser or rougher surface, in which are absent or present the pores, which in their turn are deeper or shallower, broad or narrow," and so on.

Having taken an egg with such extreme characters as the point of departure, the eggs of other species can only be compared with it in proportion to the more or less marked resemblance of their grain to one another, and to that of the fundamental form. Such comparisons are, however, only possible when you have types before you; in the absence of these, or, at any rate, of micro-photographic impressions, the best assistance for the determination of closely related eggs of one colour is afforded by tables, which allow of the comparison of the weight of the eggs (*i.e.* shells) of various species possessing either approximate or equal dimensions. In the annexed table, what at once strikes the eye is the fact that the weight is much more nearly correlated with the breadth than with the length of the egg, and that it is also in close connection with the structure of the shell, the outward sign of which is its grain.

From their external appearance alone, the extremely solid, hard shell of the eggs of *Anser anser*, *Eul. indica*, and *C. cygnoides*, coupled with their greater weight, allows of their easy distinction from the

TABLE OF WEIGHT, BREADTH, AND LENGTH OF EGGS OF ANSERINÆ

Weight in Centigrammes.										
Breadth in mm.	Length in mm.	Ans. anser.	Melanonyx segetum.	Breadth in mm.	Length in mm.	Ans. anser.	Melanonyx segetum.	Melanonyx arvensis.	Cygnopsis cygnoides.	Eulabeia indica.
65	87	×	...	59	90	2310	...	...	...	...
64	85.5	2244	...		88	1866	...	...	...	...
63.5	95.5	2352	...		87	2142	...	...	...	...
	88.5	2352	...		86.5	1980	...	...	...	...
63	94	2430	...		86	...	1500	...	...	...
	89.5	2400	...		84	...	...	1320	...	...
	89	2382, 2442	...		83.5	...	...	...	1512	...
62.5	90.5	2076	...		83	1698	...	...	...	...
62	94	2214	...		81	...	...	...	1512	...
	91	2040	...		76	...	1440	...	...	...
	89	2172	...	58.5	89	1830	...	...	...	...
	88.5	2010	...		88	2052	...	...	...	...
	86.5	1860	1680		86	1932	...	...	...	...
	84.5	1938	...		85	1776	...	...	...	...
61.5	89.5	2004	...		84.5	1716	...	...	...	...
	87.5	2130	...		84	...	...	1278 ×	...	1422
61	95	2298	...		78	...	...	...	...	...
	92	2004	...	58	89.5	...	...	...	1572	...
	91	2112, 1932	...		87.5	2022	...	...	...	...
	90	2004	...		87	1692	1536	...	...	...
	88.5	1950	...		86	1908	...	...	...	...
	87.5	1914	...		85	...	...	1338	...	...
60.5	89.5	2052	...		84	...	...	1248	...	...
	88.5	1902	...		83.5	...	1500	1308, 1278	...	...
	85	2172	...		82.5	1842	1398	...	...	1392
60	87.5	1980	...		80	...	...	1212	...	...
	86	×	...	57.5	87.5	...	...	...	1560	...
59.5	90.5	1944	...		85	...	...	×	...	...
	87.5	1890	...		83	...	×	...	...	...
	85.5	...	1476		81.5	1878	...	...	...	...
	85	1830	...		...	...	...	...	...	...

eggs of the group of bean-geese (*Melanonyx*), the porosity of whose shells at once indicates their comparatively small weight; while the delicate appearance of the shell of the eggs of the black-legs clearly indicates their comparatively slight weight. The annexed table must, accordingly, serve as the chief aid to the determination of the eggs of the species of geese quoted.

This table, unfortunately, is still rather meagre, owing to the lack of sufficient material determined with absolute accuracy: but any one who has undoubted specimens can supplement the lacunæ in the table and thus render it more nearly perfect.[1]

The weight of imperfectly cleaned eggs must never be entered in the table, and the observer must be satisfied by putting, in place of their weight, the sign × or ? in the respective column, to show that the egg of the dimensions given was unfit to weigh in consequence of not being perfectly clean. The insertion of a shell not of the true weight would render the table valueless. In its present form the table gives an experienced observer a comparatively large amount of material for determinations; and it may even prevent an amateur from purchasing or placing in his collection eggs which have been wrongly determined.

TABLE OF WEIGHT, BREADTH, AND LENGTH OF EGGS OF ANSERINÆ—*Continued*.

		Weight in Centigrammes.						
Breadth in mm.	Length in mm.	Ans. anser.	Melanonyx segetum.	Melanonyx arvensis.	Cygnopsis cygnoides.	Eulabeia indica.	Anser albifrons.	Anser albifrons gambeli.
57	85	...	...	...	×	...	...	...
	84	...	...	1272	...	...	...	...
	83	...	×	...	×	...	...	...
	79·5	1620	...	...	...	...	...	...
56·5	88·5	...	...	...	...	...	1248	...
	81·5	...	...	...	...	1422	...	...
56	87·5	...	×	...	...	...	...	...
	86	...	...	...	×	...	...	...
	84	...	...	...	1590	...	...	...
	83·5	...	1308	...	...	...	...	...
	83	...	1278	×	{ × 1530 }	...	...	...
	81	...	×	...	...	...	...	1188
	80	...	...	...	...	...	1104	...
	79·5	...	1290	...	1500	...	...	...
	79	...	...	1110	...	...	...	...
	78·5	...	...	...	1362	...	...	...
	78	...	...	1074	...	...	...	...
55·5	88	...	1350	...	...	...	...	...
	87	...	...	1296	...	...	...	...
	84	...	...	1266	...	...	...	...
	83·5	...	...	...	1500	...	...	...
	82·5	...	...	...	...	...	1146	...
	82	...	...	1278	...	...	...	...
	81·5	...	...	1314	...	...	...	...
	81	...	...	1308	...	...	1092	...
	80	...	...	1308	...	...	...	...
	79	...	...	...	...	...	1098	...
55	82	...	...	...	1398	...	...	...
	81·5	...	...	1266	...	...	...	...
	81	...	...	1260	...	...	...	...
	79	...	...	1236	...	...	...	...

[1] I consider it not superfluous to note here that the eggs of *A. anser*, *C. cygnoides*, and other *domesticated* races must by no means serve to make good the omissions. Eggs laid in captivity must always be regarded as more or less abnormal, and in no case as typical.—G. F. Göbel.

TABLE OF WEIGHT, BREADTH, AND LENGTH OF EGGS OF ANSERINÆ—*Continued*

Weight in Centigrammes.																
Breadth in mm.	Length in mm.	Ans. anser.	Melanonyx segetum.	Melanonyx arvensis.	Cygnopsis cygnoides.	Anser albifrons.	Anser albifrons gambeli.	Chen hyperboreus.	Melanonyx brachyrhynchus.	Breadth in mm.	Length in mm.	Anser albifrons.	Melanonyx brachyrhynchus.	Branta bernicla.	Branta bernicla nigricans.	Rufibrenta ruficollis.
54·5	87	...	×	...	...	...		...	...	51	79	...	...	714	...	...
	85	...	...	...	...	...	1170	...	...		74	...	...	...	726	...
	81·5	...	...	...	...	×	...	...	...	50·5	78·5	...	...	...	666	...
	79·5	...	...	...	...	1086	...	...	...		74·5	...	...	...	...	...
	79	...	...	...	...	1062	...	...	...	50	84·5	...	×	...	...	...
	78	...	...	1110	...	...	...	...	...		77·5	...	...	...	...	...
54	85	...	...	...	...	1038	...	...	...		75	...	...	...	744	...
	83·5	...	...	...	...	1038	...	...	...		71	...	...	...	726	...
	82	1470	...	...	1374	...	...	...	...	49·5	87·5	1122	...	...	...	...
	81	...	...	...	...	×	...	...	...	48·5	71·5	...	...	×	...	...
	79·85	...	...	...	...	1038 996	...	...	...	48	73·5	...	...	678	...	...
											72	...	...	756	...	...
	74·5	...	...	1092	...	...	...	...	...		68	...	...	...	627	...
53·5	86	1524	...	...	...	...	...	...	...	47·5	77·5	...	...	...	654	...
	82	...	...	...	...	×	...	...	...	47	72	...	...	×	...	...
	80	...	...	...	1194	1110 1110	...	...	...	46	71	...	...	×	...	...
										45	72	...	...	...	...	600
	78·5	...	...	...	...	1050	...	...	...							
	77·5	...	...	...	...	1062	...	...	...							
	76	...	...	...	1176	1062	...	...	...							
53	82	...	...	...	...	1086	...	...	...							
	81·5	...	...	...	...	1080	..	...	...							
	79	...	...	...	1302	...	...	...	...							
	78·5	...	...	...	1260	...	...	...	...							
	78	...	...	...	...	...	...	...	...							
	76	...	...	...	×	...	...	...	...							
52·5	89·5	...	...	...	...	...	...	1230	...							
	80	...	...	...	...	...	...	...	×							
	76	...	...	...	...	...	...	...	×							
52	82	...	...	...	...	1110	...	...	...							
51·5	83·5	...	...	...	...	...	...	...	1050							
51	80·5	...	...	...	...	...	...	...	×							

I add for convenience a short table containing the mean, maximum, and minimum dimensions and weight of the eggs placed in the main table, beginning with the heaviest and ending with the lightest specimens.

Number of eggs.		Breadth in mm.			Length in mm.			Weight in centigrammes.			*Note.*—Number of specimens furnishing weight.
		Mean.	Max.	Min.	Mean.	Max.	Min.	Mean.	Max.	Min.	
5	A. anser . . .	60.3	65.5	53.5	82.2	95.5	79.5	2002	2442	1470	Weight from 48 ex.
20	C. cygnoides . .	55.6	59	53	81.6	89.5	76	1423	1590	1176	,, ,, 16 ,,
3	E. indica . .	57.7	58.5	56	80.6	82.5	78	1411	1422	1392	...
17	M. segetum . .	57.9	62	53	83.7	88	76	1380	1080	1183	,, ,, 12 ,,
24	M. arvensis . .	56.8	59	54	81.9	87	74.5	1254	1338	1074	,, ,, 21 ,,
1	C. hyperboreus . .	52.5	52.5	52.5	89.5	89.5	89.5	1230	1230	1230	...
2	A. gambeli . .	55.25	56	54.5	83	85	81	1179	1188	1170	...
24	A. albifrons . .	53.9	56.5	49.5	81	88.5	76	1098	1248	996	,, ,, 20 ,,
5	M. brachyrhynchus .	51.5	52.5	50	80.9	84.5	76	1050	1050	1050	,, ,, 1 ,,
6	B. bernicla . .	48.1	51	46	73.1	79	71	715	756	678	,, ,, 3 ,,
6	B. bernicla nigricans .	49.5	51	47.5	74	78.5	68	690	744	627	...
1	R. ruficollis . .	45	45	45	72	72	72	600	600	600	...

The most oblong shape belongs to *C. hyperboreus*, the shortest to *E. indica*.

The mean long diameter exceeds the mean short diameter in—

C. hyperboreus	by 37 mm.	C. cygnoides	by 26 mm.
M. brachyrhynchus	„ 29.4 „	M. segetum	„ 25.8 „
A. anser	„ 27.9 „	M. arvensis	„ 25.1 „
A. gambeli	„ 27.75 „	B. bernicla	„ 25 „
A. albifrons	„ 27.2 „	B. bernicla nigricans	„ 24.15 „
R. ruficollis	„ 27 „	E. indica	„ 22.9 „

G. Göbel.

II

Extract from the Diary of the Visit to Kolguev in 1902 of Mr. S. A. Buturlin, kindly communicated by the Author

On August 9, 1902, I landed on Kolguev. On the same morning the members of the Norwegian expedition, who were going to winter on Matochkin Shar, killed, near Bugrino Stanovishchi, a pair of true white-fronted geese (*Anser albifrons*), which I examined an hour or two after they were shot. Their feet were yellow-orange, bills pale milky rose-colour, with a very slight tint of purple (or lilac) and a scarcely perceptible admixture of yellow at the very edges of the nostrils, between the rami of the lower mandible and in the middle of the culmen of the upper mandible (nail pale horn, like human nail [1]). They were old birds almost moulted.

The same day I saw in the possession of Vasili Petrovich Popov from Pustozero, who had been here already ten days with his schooner, a bean-goose (*Melanonyx segetum*), killed the previous day (August 8), with an oval, slightly bent nail, short massive bill (not accurately measured), 23 teeth on each side of the upper mandible, and typical (for this bird) annular extension of the yellow-orange colouring of the bill. This was an old moulted bird. I did not take this bird from the Popov, but, at his proposal, removed the heads and bills (Nos. 410-414 of my collection) of the bean-geese taken the same day.

On August 11 Father Platon Kulakov received as a present from the Samoyeds several freshly killed geese, of which there fell to my lot four heads of bean-geese and the head of a white-front with colouring similar to the above.

During an excursion to the river Vaskina, on August 13, when crossing the river Kambalya, in the early morning, a flock of some half-dozen bean-geese were put up from the flooded land; and during the day two pairs of bean-geese flew over our camp on the Vaskina, but far off.

On August 16 I was on the Promoinaya Gulf. This extensive sheet of shoal water, not less than 25 square versts, is separated by a narrow sand-bar from the ocean, with which it communicates by a strait about 100 fathoms wide. Even to my eye, already familiar with the vast boggy valleys of the Kolguev tundra, the neighbourhood of Pomoinaya Guba produced the impression of a perfect plane stretching for miles. Far to the north appeared the crests of the "Yurennye Sorlopy" ("sorlopy" are high river-cliffs) and the rounded summit of the Dorozhkina Sopka (cone); but even the insignificant sand-dunes (20 to 25 feet high) on the bar, trending westwards, produced the effect of hills in this monotonous plain.

The whole of this sand-flat, interspersed with mud, carrying the scantiest and poorest vegetation, is thickly dotted with pools, meres, and lakes of the most heterogeneous sizes and forms, in one part widely scattered, but in another connected by a whole labyrinth of channels with more or less stagnant water. Such of the smaller of these sheets as are fresh water are probably the result of snow and rain; but others are sensibly brackish, and contain myriads of marine crustaceans.

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[1] *i.e.* of quite the same colouring as indicated by myself in the article on this goose, and at the same time as the description of the American variety, *Anser albifrons gambeli*, as if in distinction from the European form.

On approaching the bay, it is impossible to tell where the land ends and water begins; the absolutely flat land gradually and imperceptibly passing into the unruffled surface of the bay, the mire merely becoming gradually thinner, and the foot sinking deeper and deeper at every step. A few hundred paces from the first pools and inlets of the bay the mud is quite liquid, but small hummocks and elevations from one to two inches high project above the water, and half a mile from the shore the gulls wander about without wetting their feathers.

In this locality, indeed, we may actually see the formation of land; according to my friend Yablya, who was born on Kolguev forty-three years ago, the whole of this vast plain being still flooded by the sea during high autumn tides.

The dead monotony of these boundless stretches of sand, mud, and water is relieved by an extraordinary wealth of bird-life; species like *Calcarius lapponicus*, *Otocoris alpestris*, and *Anthus cervinus* continually rising before our reindeer, while here and there may be seen examples of *Motacilla alba*. More abundant is *Larus glaucus*, and still more numerous *L. affinis*, individuals of which hovered in alarm above our heads; while from all sides are heard the harsh notes of *Colymbus septentrionalis* and *C. arcticus*. Scores of the timid *Charadrius pluvialis* scud away on all sides, while numbers of *Squatarola helvetica* and *Ægialitis hiaticula* rise into the air with loud cries in the distance, their melodious notes resounding in the light haze pierced by the sun's rays.

Here and there on the meres appear broods of *Harelda glacialis* and *Somateria spectabilis*, while flocks of *Phalaropus hyperboreus* are swimming off the shore, which allow the stranger to come within a few paces. Flocks of *Tringa minuta* and *T. temmincki*, and thousands and thousands of *Tringa subarquata* (on their way from Taimyr to the coasts of Western Europe), fill the air with their faint pipings, and alight at one moment on the sludge, at another on the water of the shallow bay hundreds of paces from the shore, covering whole acres as they run in the shallow water.

This Promoinaya Bay and its environs form one of the favourite collecting-grounds of the moulting Kolguev geese.

We were late for the moulting-time and the Samoyed goose-drives, which this year were far less successful than they used to be two or three years ago (when one drive alone yielded 7000 birds); but footprints and droppings were everywhere to be seen, and small flocks of bean-geese kept passing high overhead.

In one narrow but long lake near the bay itself we saw a pair of geese in the distance. As we approached the spot, these landed on the opposite shore, but Yablya's dog gave chase, and finding it safer not to continue on land, they returned to the water, where we shot them, after firing several times. No other geese were seen near the lake; but some hours later, when we were again passing the lake on our way back, a solitary goose was seen, which allowed me to get near, and was accordingly shot. While I was thinking how to retrieve it, a second goose appeared, not on the wing but from somewhere on the shore. I fired twice at long range; after the first shot it dived, and after the second flew heavily off the lake; but two more shots brought it down and the dog retrieved it.

Both these were young bean-geese.[1] The first had much down left on the lesser wing-coverts, the upper side of the neck, the rump, and thighs; while the flight-feathers had scarcely emerged from the stumps. The total length from the end of the bill to the end of the tail was 521 mm. The second was already fully fledged, but the wings were not quite grown. Total length, 670 mm. Their legs were yellow-orange, much obscured with dingy grey; bills dark, with traces of a lighter band and a whitish tip to the dark nail.

August 17—a magnificent, warm sunny day—we passed on the Vaskina; the day before we went to bed very late, and I rose at noon and crept out of the tent to bathe in the river. The tent stood on a rising on the right bank, twelve feet above the river. Scarcely had I got fifteen paces from the

[1] One of these (No. 443) was quite correctly determined by Mr. Buturlin as *M. arvensis*, as the nail on the upper mandible occupies no more than one-fourth of the culmen. Besides this, its head is considerably lighter than in the young geese from Kolguev, which I consider undoubted *M. segetum* (Nos. 432, 433, 434, 436, and 437 of the same collection). I doubt, however, whether the darker "earthy" colouring of the head in the young *M. segetum* of this age and the lighter brown of young *M. arvensis* can serve as a sufficient character to distinguish these two species of geese, as the young in down of many lamellirostres present great variations in colouring.

tent, when I saw, on the very spot where I proposed bathing, a large flock of geese. Cautiously retiring behind the crest of the steep bank, I rushed back to the tent, and having snatched up my Winchester, stealthily returned. The geese were still there, drinking and cropping the grass. As it was too near to shoot (some 25 paces from the crest over which I was looking), I resolved to approach the geese quietly and shoot the biggest on the wing. Great was my astonishment when the geese not only did not rise on my appearing over the crest, but paid no attention to me whatever. I approached closer and counted them. There were 18 birds of different ages, the young ones being three-quarters the size of the adults, with traces of down; the biggest were quite as large as full-grown bean-geese.

Only when I walked on openly, and was but a fathom from the flock, did the young birds, after an exchange of low cacklings, unwillingly move down-stream along the bank. Having followed them some 70 paces as far as the widening of the flooded land, I decided to drive them away from the river. I succeeded in doing this, but, apparently alarmed by my importunity, the whole flock quickened its step and set off for a small lake 100 paces from the river. Here I scattered the flock by shouting and throwing earth at them, and eventually brought down the biggest bird. At the shot, part of the flock made for the lake, and part for the river and higher tundra, the larger birds half flying. One of the largest did not run at the report of the gun, but threw itself down on the ground, with outstretched neck. By chance, instead of being in the grass, it was on dry moss, so that, however close it lay, it still remained in full view. Notwithstanding, it allowed me to approach quite close, and while I walked round it two or three times at a distance of only 2 or 3 feet, it lay motionless as if dead, although watching me the whole time with its large dark eyes.[1]

At last I put my gun down on the moss, and threw myself on the goose, which, however, dexterously extricated itself and started off at a sharp pace, arching its back and stretching forward its head. At this moment my two companions—Yablya and Nikolai Ledkov (a young Samoyed from Novaia Zemlia)—came up, and caught both this and another young bird. In both specimens the bill was dark, but the narrow subterminal band was already faintly indicated by its paler colour. I was loth to kill them, and so set them free on the river, where they dived and swam about for a long time in full view of our tent.

It must be added that we passed most of the 15th in the same place and saw no geese, although we went round the neighbourhood shooting; but in the evening of the 15th and on the 16th we were at the mouth of the Vaskina and on Promoinaya Bay, the tent and part of the sleighs remaining as we left them.

During the latter day three more old bean-geese flew past; and I then learned from the Samoyeds that although they knew the barnacle (*Branta leucopsis*, Bechst.), they did not know definitely whether it breeds, as, according to their statement, it is very rarely met with, but they were of opinion that it does not nest.

On August 18 we drove from the Vaskina to Krivoe Lake, thence to the Sovandei and Anuru Hills, and on the evening of the 21st to our base of operations—the church at the mouth of the Bugrina (Bugrino Stanovishche), without detecting any trace of geese. On the 23rd the Samoyeds brought one old *Anser albifrons*, showing the rosy colouring of the bill already described, and a pair of bean-geese, one of which had 20 and the other 25 teeth on each side of the upper mandible, while the nails in both were oval and slightly arched; the bill was mostly black with an annular area of yellow. One was a young *Melanonyx*, which I added to the collection.[2]

Starting the same day (August 23) for Stanovoi Sharok, I saw a pair of bean-geese—passing over the Bugrina. Farther on the road to the Sharok, and from Sharok to the mouth of the Peschanka, we saw no geese, and not till the 26th did I see a pair in the distance (I think bean-geese), near the southern end of Peschanoe Lake. Nevertheless, the deep lands near the sea, between the rivers Barkho and Peschanka, and the Peschanoe Lake are, like Promoinaya Bay (and the Goose Lakes), the headquarters for the wholesale catch of moulting geese—only earlier in the year, in the summer.

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[1] This specimen was undoubtedly a young yellow-bill, as the nail occupies only one-fourth of the total length of the upper mandible.

[2] *M. segetum*, with 24 teeth on each side of the upper mandible.

It is here worth noting that anent Mr. Trevor-Battye's account of the taking of thousands of moulting geese on Kolguev, I have read in certain sporting magazines articles expressing indignation, and calling upon the authorities to put a stop to such barbarities. One must, however, know something of local conditions to understand the absurdity of such philippics.

In the first place, even if the "proper authorities" wished to protect the geese of Kolguev at the expense of the natives of Kolguev, they have not, as a matter of fact, the means to carry out such a plan. Kolguev is neither Pavlovsk nor Pargolovo. There is no local "authority," and not a single Russian mission; it is not so easy to get to that lonely nook in the Arctic Ocean, protected as it is by shoals, fogs, storms, and ice-floes. It is quite unlike Novaia Zemlia, with its deep bays shut in by high shores.

In the second place, the Samoyeds are extremely humane, good-hearted people, incapable of cruelty to animals, and lazy like all Asiatics. If they take the trouble to organise an annual hunt of moulting geese (while strictly avoiding molesting them in the pairing and hatching season—a sensible measure, the utility of which many of our "intelligent" sportsmen have yet to learn), this is because they cannot do otherwise. The Samoyed must eat, and it is not easy to be a vegetarian in 69° N. lat. (the sole "fruit of the earth" being the cloud-berry, which ripens then in large quantities, but by no means every year). He cannot put to sea in his cockle-shell boats; and fish in the lakes on the island (*Salmo* and, more particularly, various species of *Coregonus*) is not plentiful. Wild reindeer there are none, and the tame beasts, serving both as a medium of exchange and as animals of draught, cannot be slaughtered *ad libitum* for food. Moreover, a considerable proportion of the latter are considered to belong to the Russian traders from Pustozero. It is for these reasons that the Samoyeds lay in a stock of geese[1] to feed themselves and their dogs during the long and dreary winter.

A real evil, yet one in nowise to be averted by prescriptions from the authorities, are the drives of "turpan," as the king-eider (*Somateria spectabilis*) is here called (the turpan of Russian writers, *Œdemia fusca*, is here very rare, according to the Samoyeds, and I have not seen it at all). Instead of consuming hundreds and thousands of turpan every year, it would be much more profitable for the Samoyeds (and the Pustozero traders as well) not to touch them at all, but merely gather the eider-down from the nests and barter it to the Pustozero people for flour and reindeer-meat.

Only on August 27, on returning from Peschanoe Lake to Stanovoi Sharok, did I see the first large flocks of brent (probably *Branta brenta*), seemingly ready to migrate.

During the following days flock after flock of brent flew off south, overtaking us on our return to Bugrino Stanovishche and settling on the sand-banks of the shore and the muddy stretches in the river valleys. Especially large numbers of them were seen on September 1 and 2 in the lower reaches of the Bugrina and on the shoals at its mouth. The valley here widens out to half a verst, and the sand-banks project more than a verst into the extensive bay. Here, particularly towards evening, the brent gathered in flocks of several hundred each.

On September 2 I noticed among them a separate gaggle of 11 bean-geese.

The brent (*Branta brenta*) during its passage evidently kept more to the seashore; and after starting from Bugrino Stanovishche to the north across the middle of the island, we ceased to meet them. On the other hand, during this journey, on September 2, on the Kekurnoi Pervy, in the hills, and on the Peschanka, we were constantly seeing skeins and wedges of bean-geese (*Melanonyx* sp.) flying south. They did not gather in such masses as the brent, although on the whole there were many on the wing, and often flock followed close on flock and they kept their formation, while the brent usually flew without any definite order. Some of these flocks alighted to rest on the sands of the valley of the Peschanka.

On the following day, September 3, we continued to meet flocks of bean-geese, usually of from 8 to 15 birds each, either passing high in the air, with their wonted cackle, or sitting on the sands of the more considerable streams (*e.g.* the Gusinaya).

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[1] How important the geese are in the economy of the Kolguev Samoyeds appears from the fact that, although the island and the reindeer pastures, and the collecting of drift-wood are common property for the general use, the places where the goose-drives occur are strictly apportioned.—BUTURLIN.

Footprints and droppings of geese were met with in large quantities everywhere on the shores of the Gusinyya Ozera (Goose Lakes) mentioned above.

On the same day, in the lower part of the valley of the Goose River, I started a goodly gaggle of brent, and in the evening, at its very mouth, some 26 geese of larger size, which from their call I took to be white-fronts (*Anser albifrons*), but was unable to get any.

Next day, the 4th, on the lower course of the Goose River, I saw many flocks of geese, containing from 10 to 40 individuals apiece, mainly *Branta brenta*, but there were also *Anser albifrons* and *Melanonyx*.

In crossing from the far side of the Gusinaya back to camp, I started one of these flocks from the grassy terrace of the valley, but one young bird went on browsing the grass until I got within shot, and only then flew up, but fell to my gun. This was a brent of the year's brood, with very considerable white patches on the neck and typical in the colouring of the belly. The stomach, besides grass, contained seeds.

On my way back, on the 5th, I saw in the valley of the Peschanka several flocks of brent and a small skein of bean-geese—13 in all—a number not seldom recurring in their flocks. On this and the next day we met, farther on, and in the valley of the Bugrina, skeins of bean-geese passing south.

In the mouth of the Bugrina, on the following days—10th to 13th—masses of brent arrived, and kept usually near the shore. We more than once shot at them at 600 to 700 paces, but without success.

By the middle of September there were very many brent-geese, both on the strand and the lower reaches of the rivers; while in the latter spots there were likewise many flocks of bean-geese, of which there were also plenty on the lakes of the low tundra, where they usually gathered towards evening, raising a loud cackle.

On September 19 the *Vladimir* came in and took us away from Kolguev.

When we approached Novaia Zemlia it was covered with snow. On September 23 it froze hard in Moller Gulf, the day temperature fell to $-3°$ C., and the night much lower; on the 25th at Matochkin Shar it reached $-3\frac{1}{2}°$ C. According to the members of the Norwegian expedition, at night the temperature fell to $-10°$ C., and it was about a fortnight after almost all the waterfowl had left that I found the river Matochka and the lakes indeed frost-bound.

The Norwegians (Mr. Korin) showed me an example of *Branta brenta*, shot a week before from a passing flock of a hundred, and also some specimens obtained in the neighbourhood during the beginning of their stay at Matochkin Shar, undoubtedly of geese nesting there. Some of them were *Melanonyx segetum*, others undoubted *M. neglectus*.

The next day I was to come and choose some examples for my collection, by the kind offer of the Norwegians, but a most violent storm kept us on Novaia Zemlia, and did not allow of communication with the shore.

According to the old resident Prokopi Vylka (one of the best traders and most intelligent of the Samoyeds), five different kinds of geese occur here :—

1. "Big goose"—evidently different species of *Melanonyx*.
2. "Little black goose, vàrra"—evidently *Branta brenta*.
3. "Nòrovoi, face and bill white, small"—probably *Anser albifrons*.
4. "Bill black, tail fairly long, belly white, small, called segobya,"—is not this *Branta leucopsis*, or *Branta brenta glaucogaster*?
5. "Mottled, called labù"—I think *Rufibrenta ruficollis*, as Vylka notes its scarceness; but Mr. Trevor-Battye gives the name "labóo" as Samoyed for *Branta leucopsis*; he might, however, be mistaken.

S. Buturlin.

January 16, 1903, Marienburg, Lifland.

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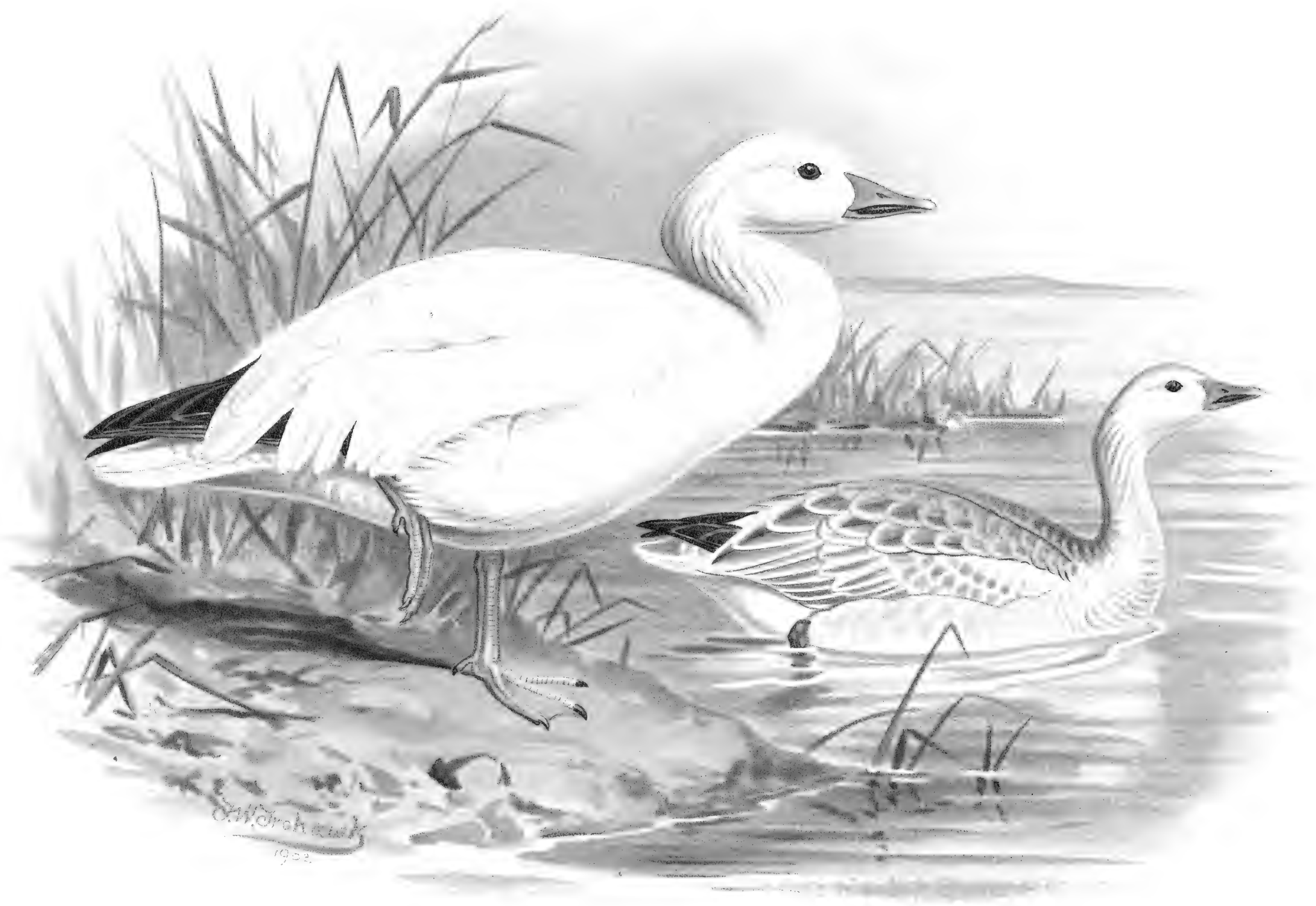
PLATES

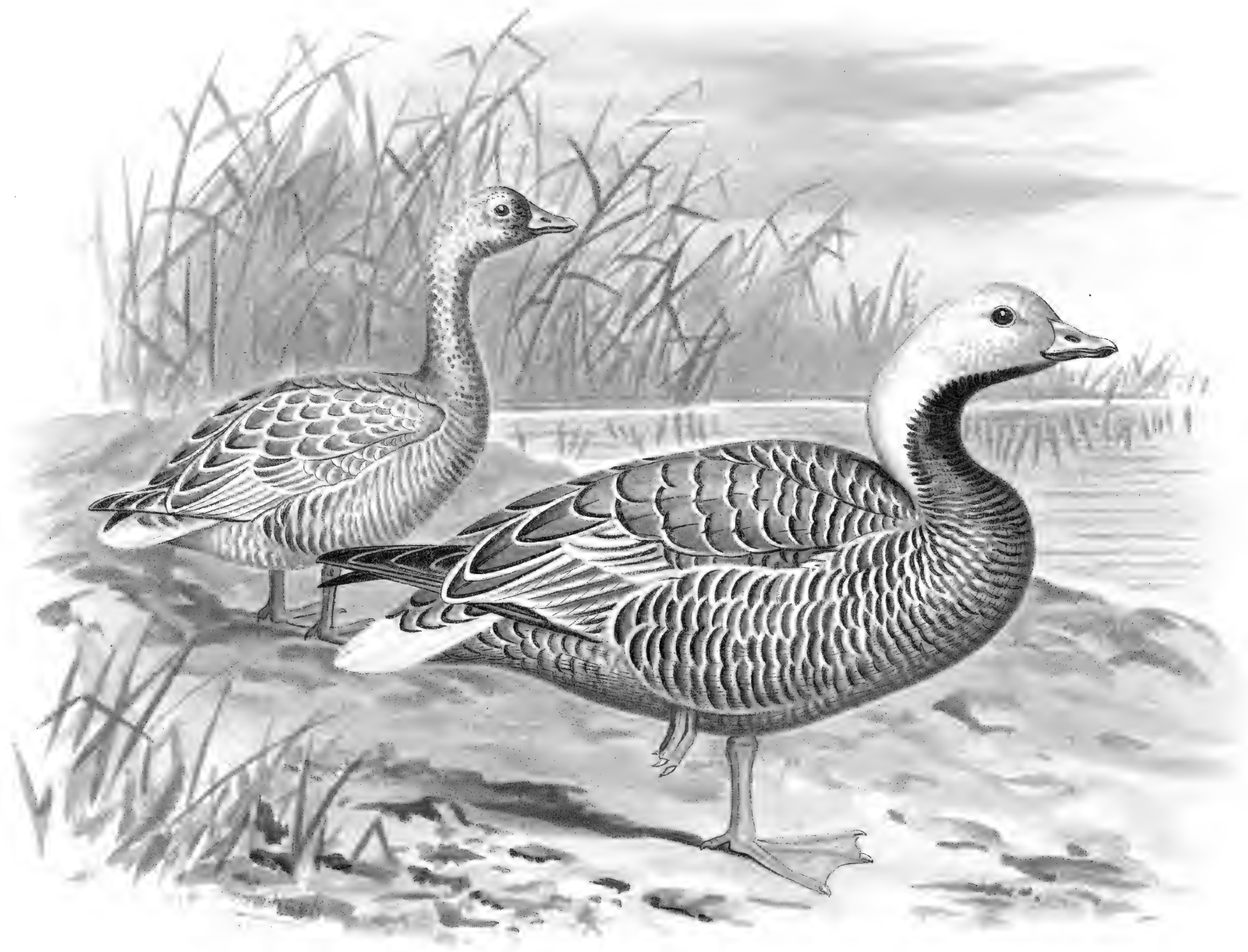


♂ ad. 1/4 juv.

Snow Goose.

Бѣлый гусь. Chen hyperboreus, Pall.

Лит. Т-ва И.Н.Кушнеревъ и К°. Москва

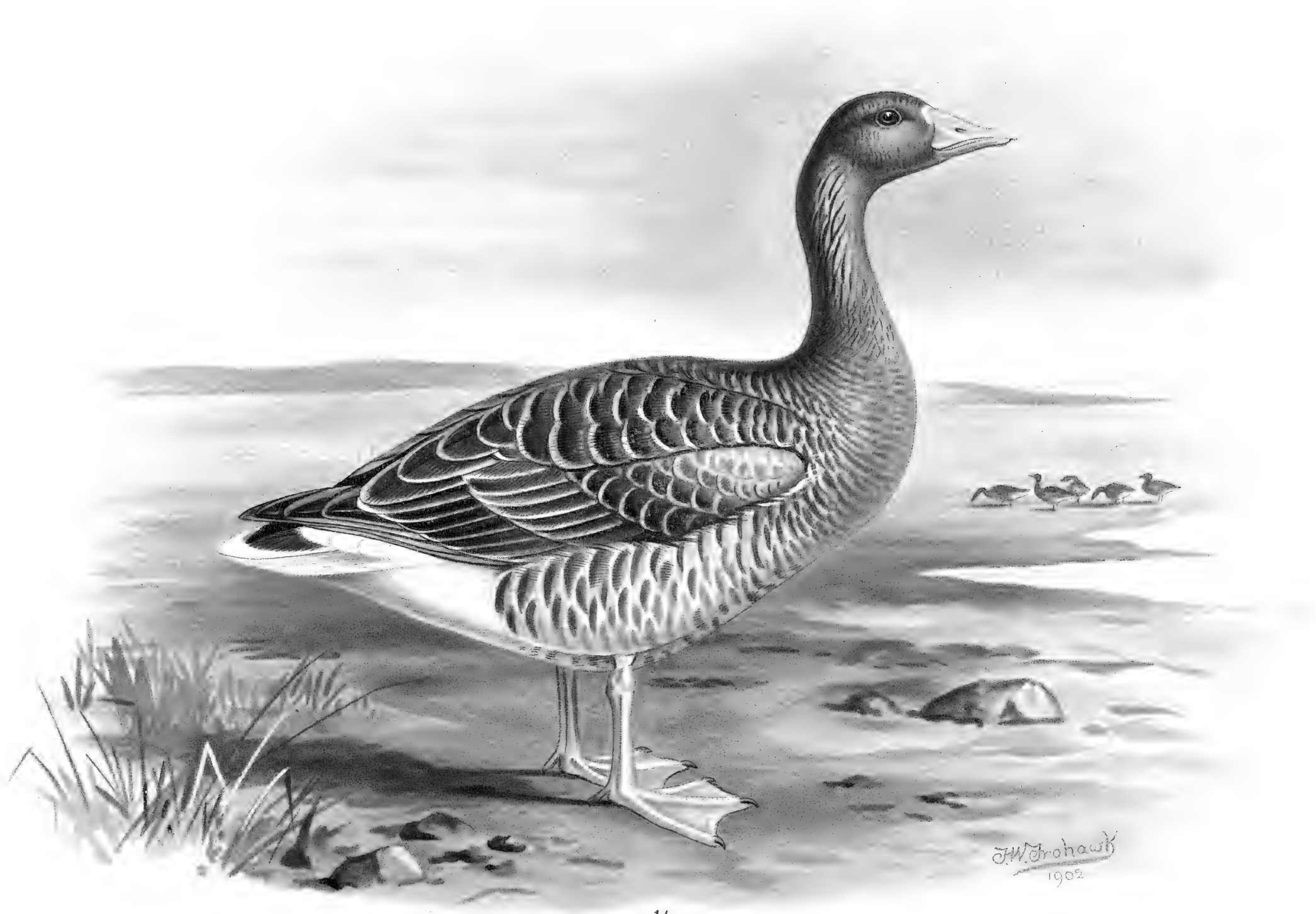


juv. 1/4 ♂ ad.

Emperor Goose.

Бѣлошей. Philacte canagica, Sewast.

Лит. Т-ва И Н Кушнеревъ и К° Москва

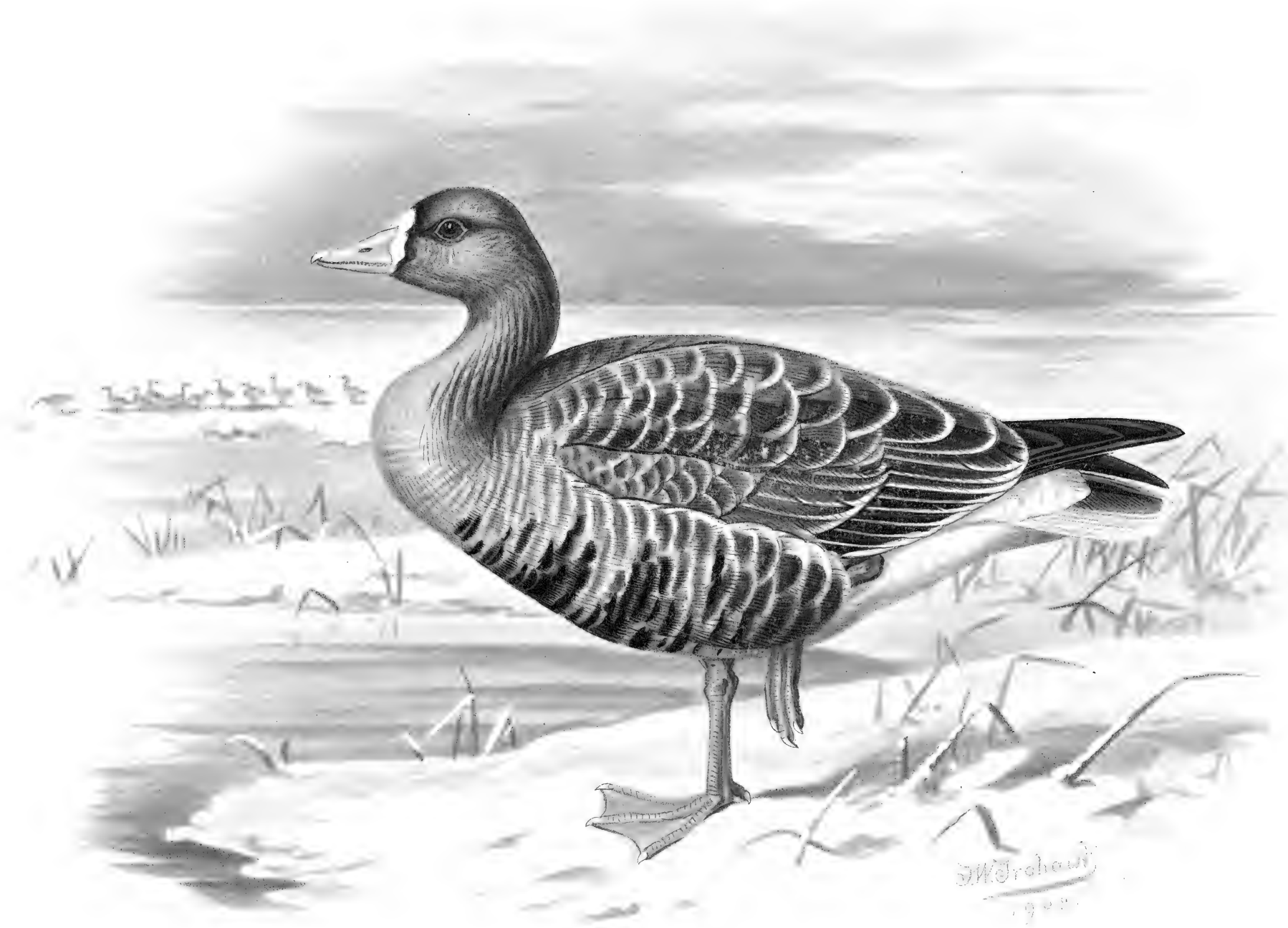


1/4

Grey Lag.

Сѣрый гусь. Anser anser, L.

Лит. Т-ва И.Н.Кушнеревъ и К°. Москва

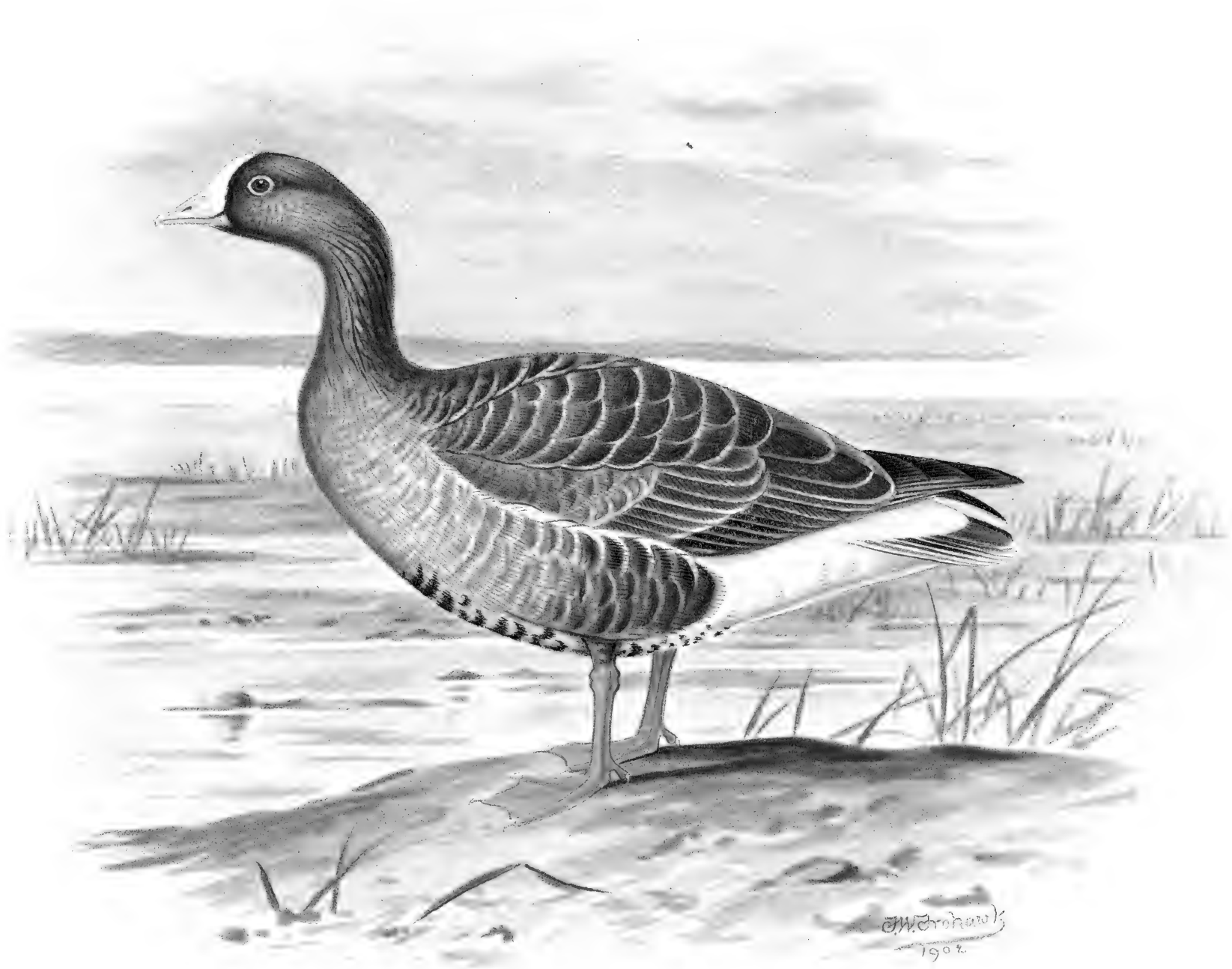


♂ ad. 1/4

White-fronted Goose.

Бѣлолобая казарка. Anser albifrons, Scop.

Лит. Т-ва И.Н.Кушнеревъ и К°. Москва

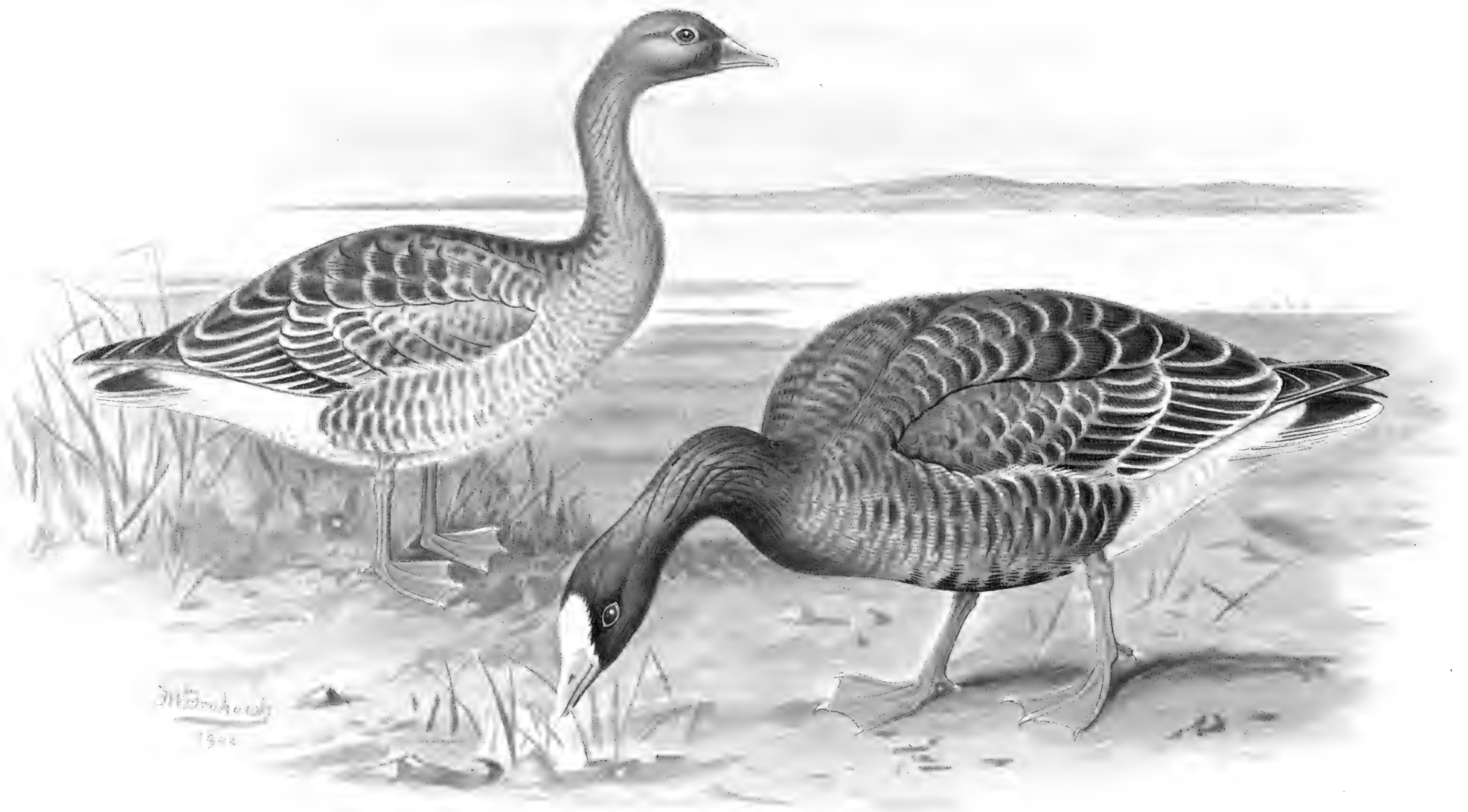


1/4 ♂ ad.

Lesser White-fronted Goose.

Пискулька. Anser finmarchicus, Gunner.

Лит. Т-ва И.Н.Кушнеревъ и К° Москва



juv. $^1/_4$ ♀ ad.

Lesser White-fronted Goose.

Пискулька. Anser finmarchicus, Gunner.

Лит. Т-ва И.Н.Кушнеревъ и К°. Москва

1/4 ♂ ad.

Sushkin's Bean Goose.

Уфимскій гусь. Melanonyx neglectus, Suschkin.

Лит. Т-ва И.Н.Кушнеревъ и К°. Москва

♂ ad. 1/4

Pink-footed Goose.

Коротконосый гусь. Melanonyx brachyrhynchus, Baill.

Лит. Т-ва И.Н.Кушнеревъ и К° Москва

♂ ad. 1/4

Yellow-billed Bean Goose.

Полевой гусь. Melanonyx arvensis, Brehm.

Лит. Т-ва И.Н.Кушнеревъ и К°. Москва.

♂ ad. 1/4

Middendorff's Goose.

Большой гуменникъ. Melanonyx arvensis sibiricus, Alph.

Лит. Т-ва И.Н.Кушнеревъ и К°. Москва.

♂ ad. 1/4

Bean Goose.

Пашенный гусь. Melanonyx segetum, Gmel.

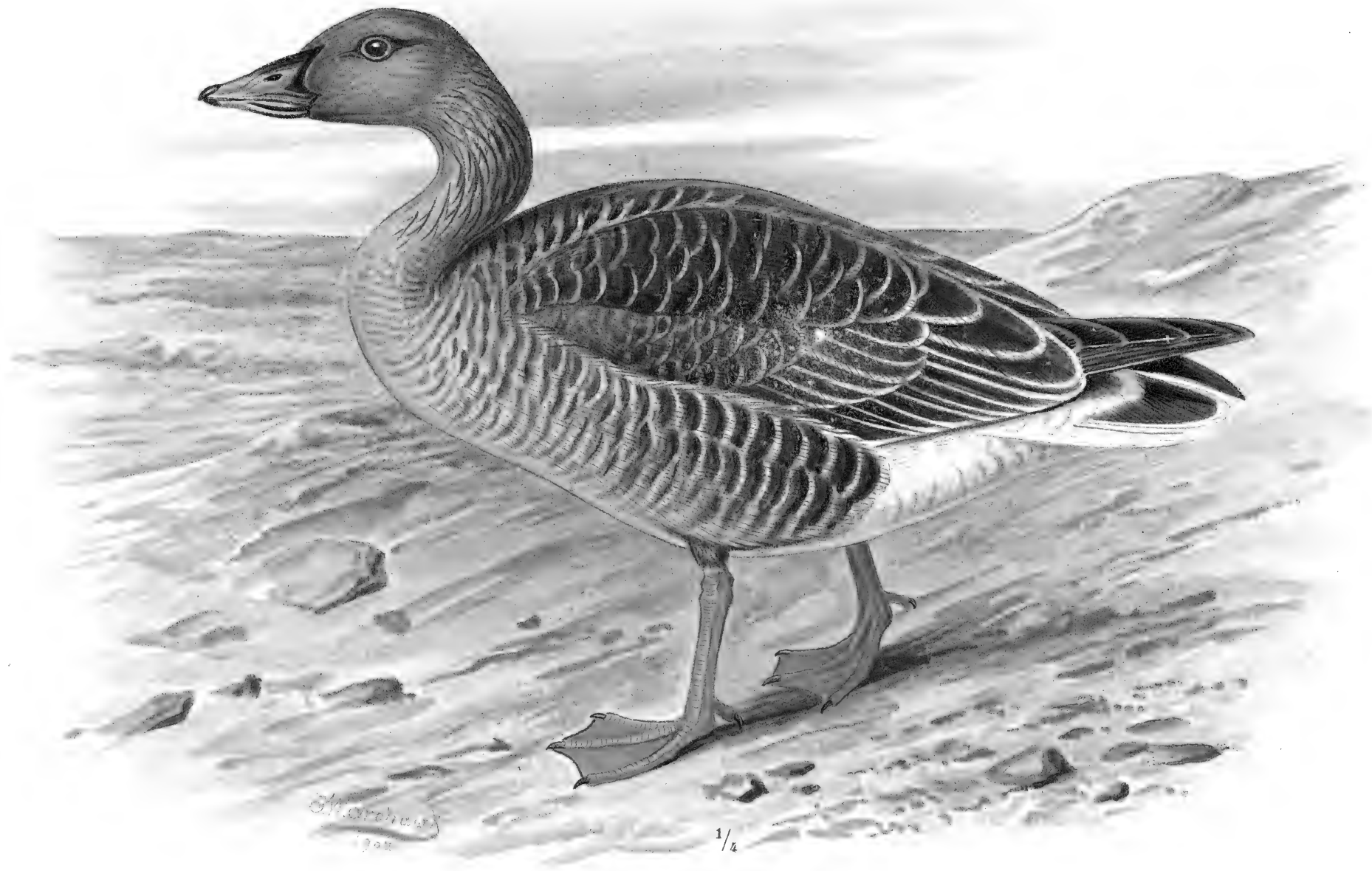
Лит. Т-ва И.Н.Кушнеревъ и К°. Москва

♂ ad. 1/4

Eastern Bean Goose.

Сибирскій пашенный гусь. Melanonyx segetum serrirostris, Swinh.

Лит. Т-ва И.Н.Кушнеревъ и К°. Москва.



Thick-billed Goose.

Клювастый гусь. Melanonyx mentalis, Oates.

Лит. Т-ва И.Н.Кушнеревъ и К°. Москва

1/4

Barred-headed Goose.

Горный гусь. Eulabeia indica, Lath.

Лит. Т-ва И.Н.Кушнеревъ и К°. Москва

Red-breasted Goose.

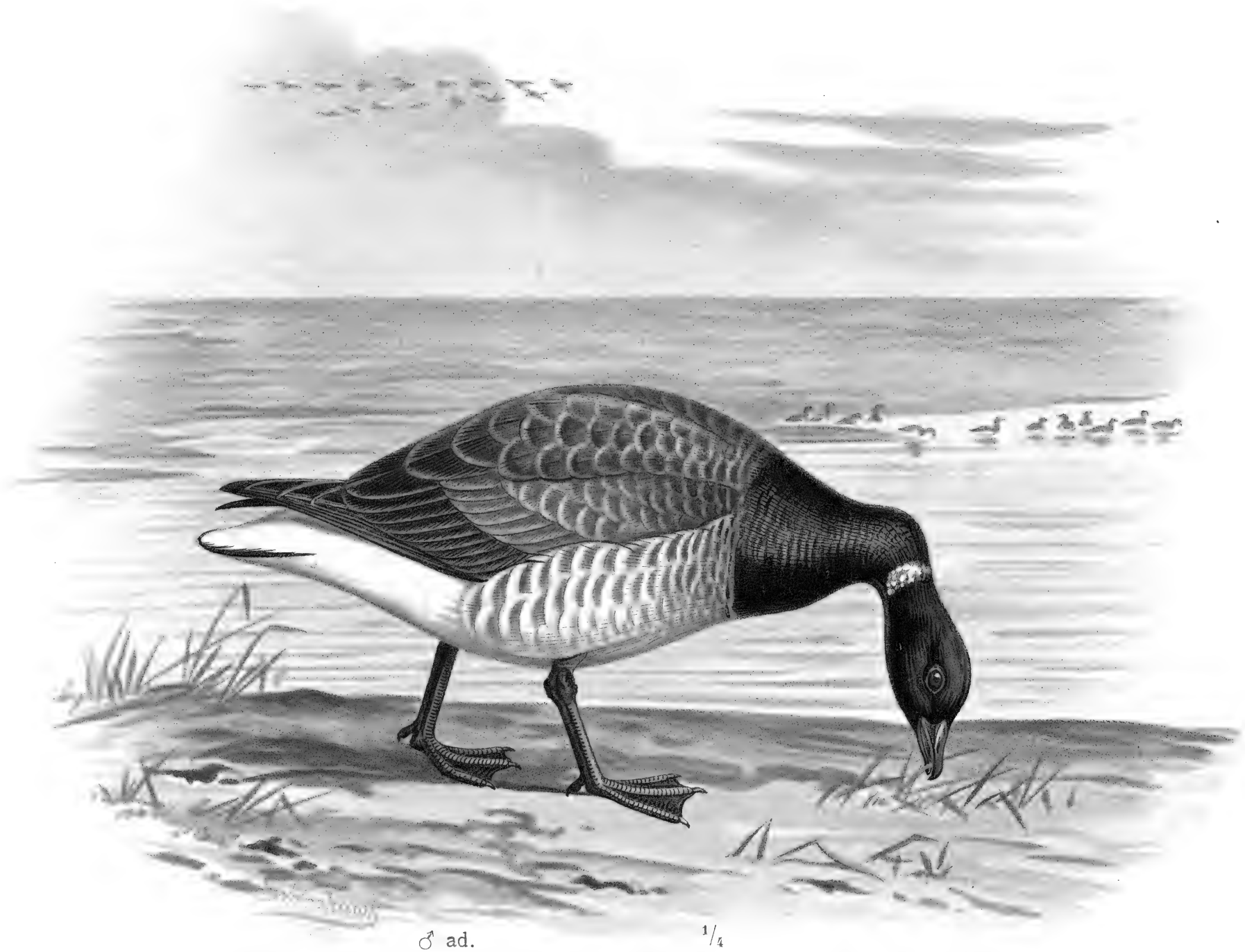
Краснозобая казарка. Rufibrenta ruficollis, Pall.

Лит. Т-ва И.Н.Кушнеревъ и К°. Москва

Brent Goose.

Черная казарка. Branta bernicla, L.

Лит. Т-ва И.Н.Кушнеревъ и К°. Москва



♂ ad. 1/4

Light-bellied Brent.

Свѣтлобрюхая казарка. Branta bernicla glaucogaster, Brehm.

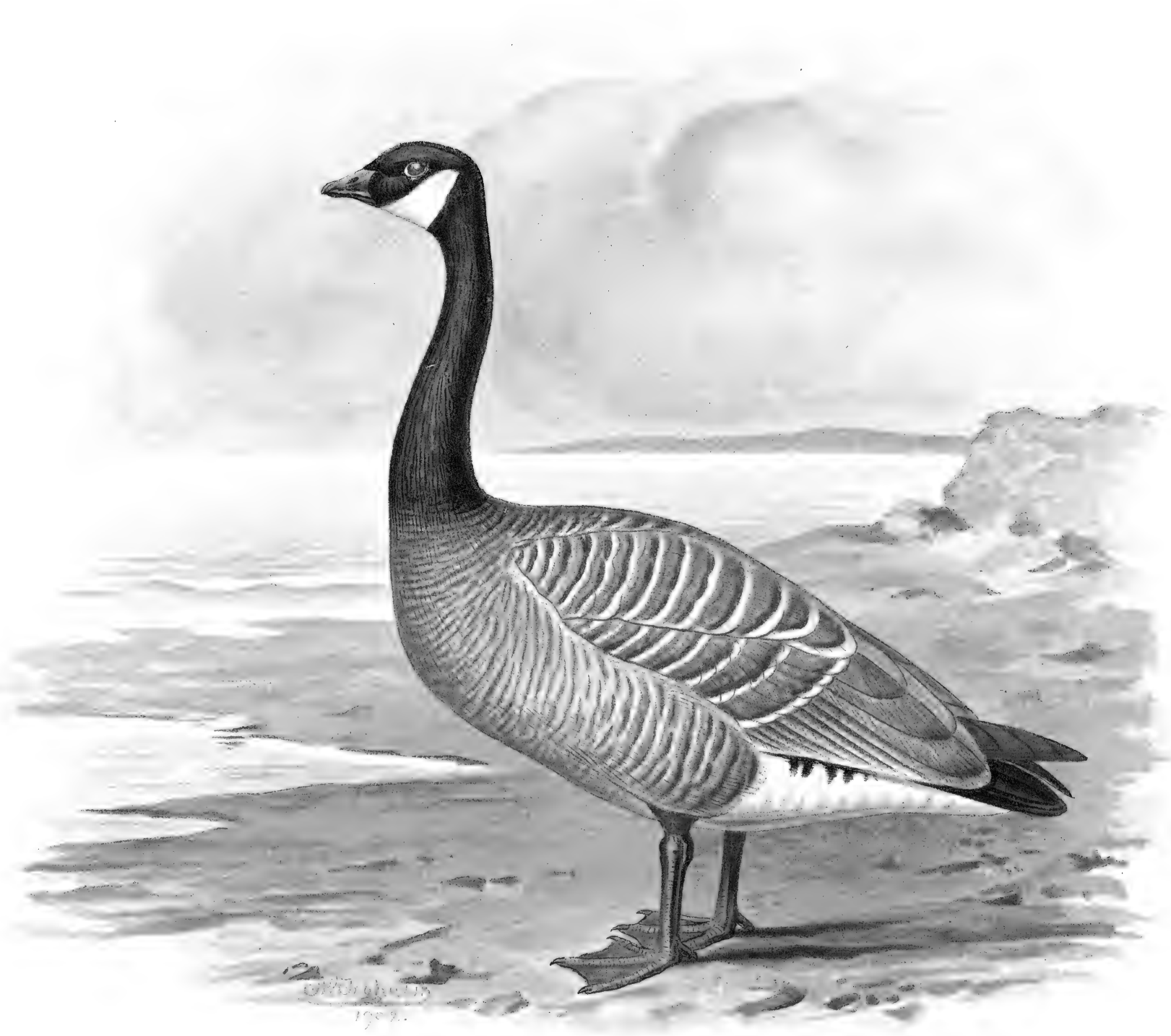
Лит. Т-ва И.Н.Кушнеревъ и К° Москва

1/4 ♂ ad.

Black Brant.

Чернобрюхая казарка. Branta bernicla nigricans, Lawr.

Лит. Т-ва И.Н.Кушнеревъ и К°. Москва



Hutchins's Goose.

Канадская малая казарка. Leucoblepharon hutchinsi, Rich.

Лит. Т-ва И.Н.Кушнеревъ и К° Москва

Barnacle Goose.

Бѣлощекая казарка. Leucopareia leucopsis, Bechst.

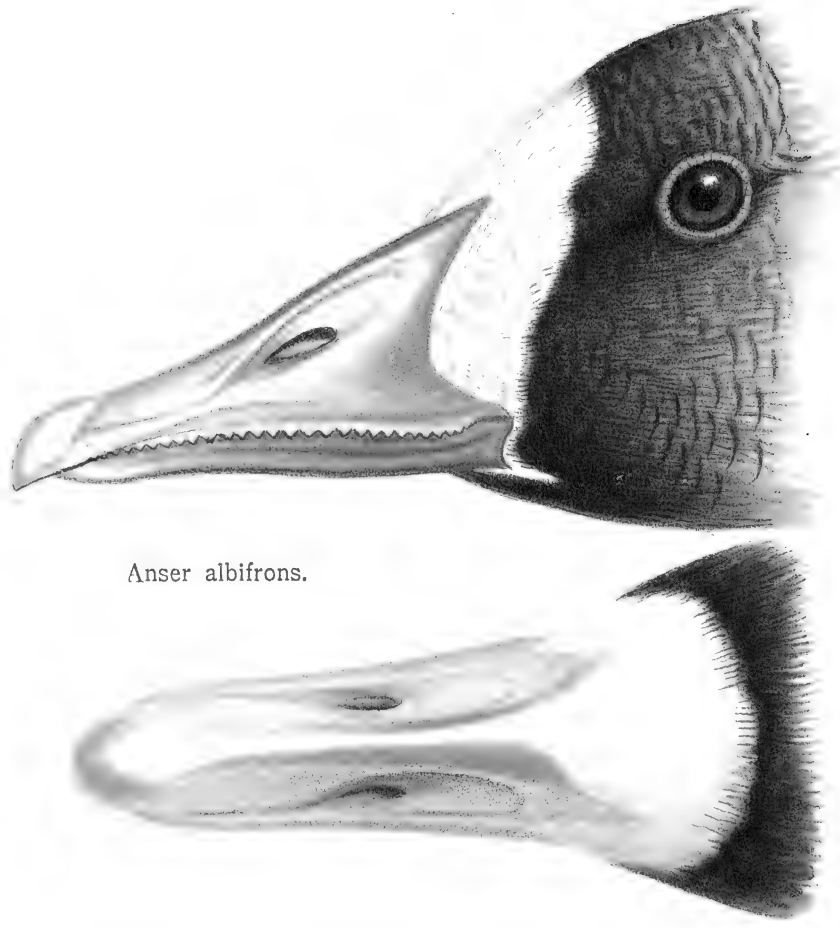
Лит. Т-ва И.Н.Кушнеревъ и К° Москва.

♂ ad. 1/4

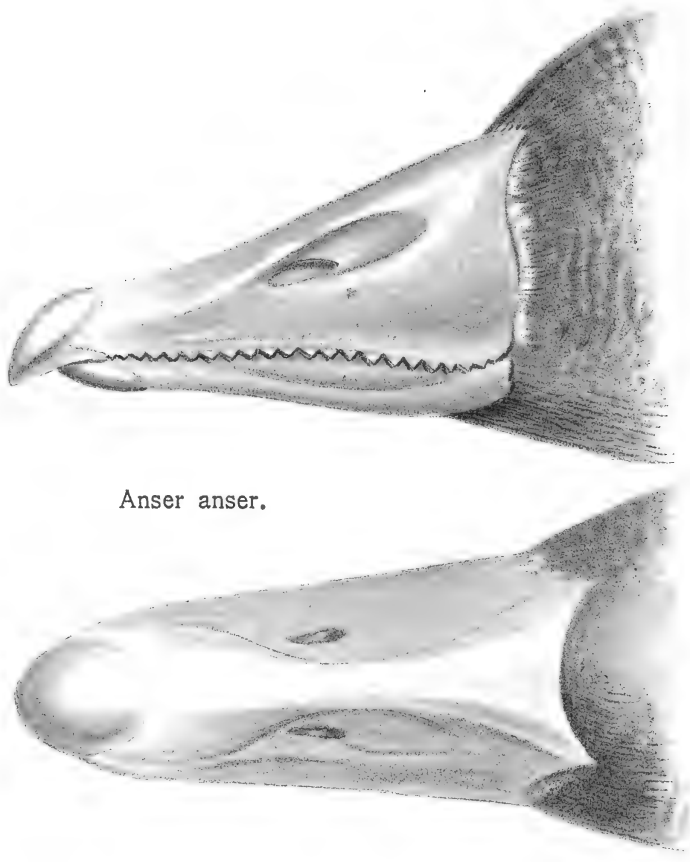
Swan-Goose.

Сухоносъ. Cygnopsis cygnoides, L.

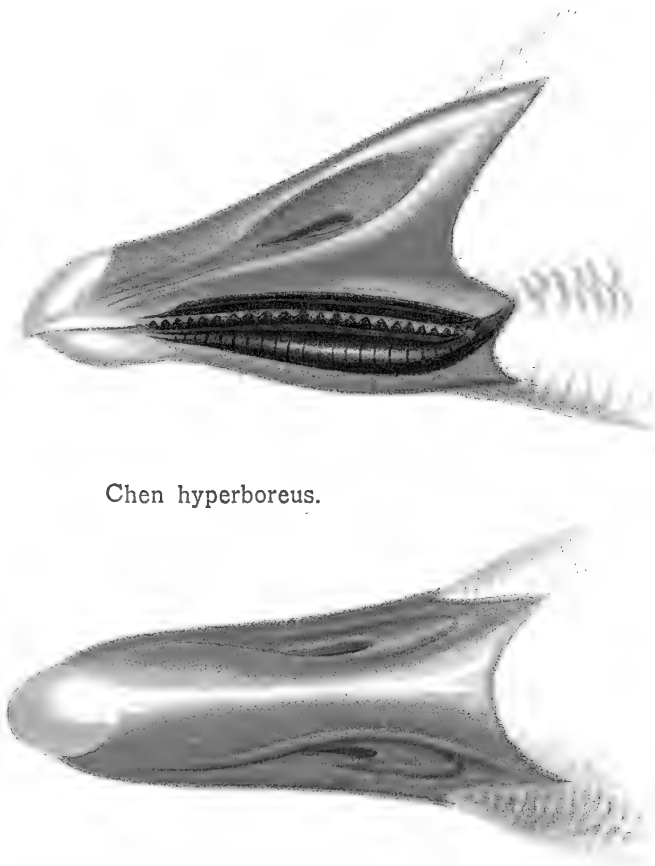
Лит. Т-ва И.Н.Кушнеревъ и К°. Москва.



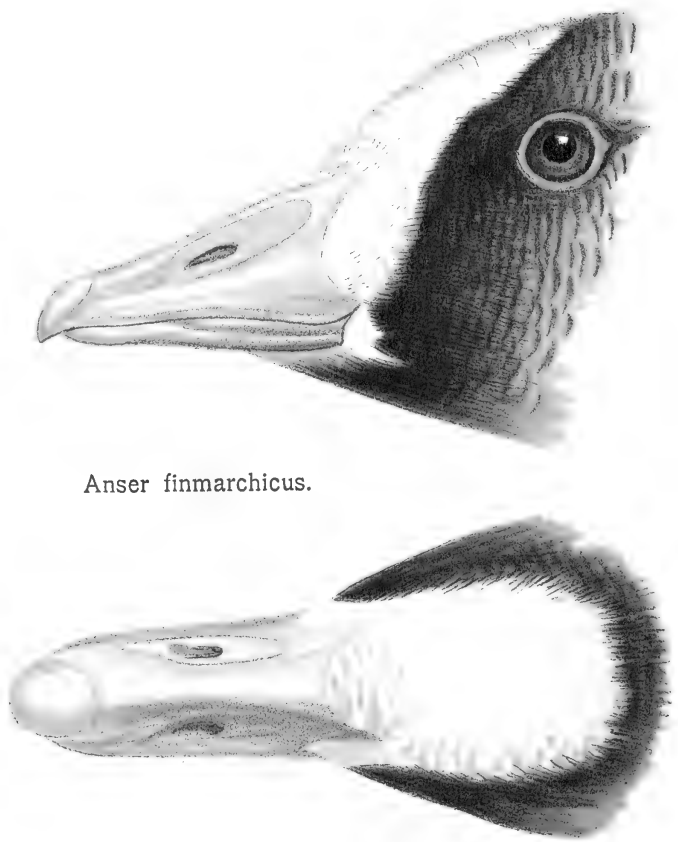
Anser albifrons.



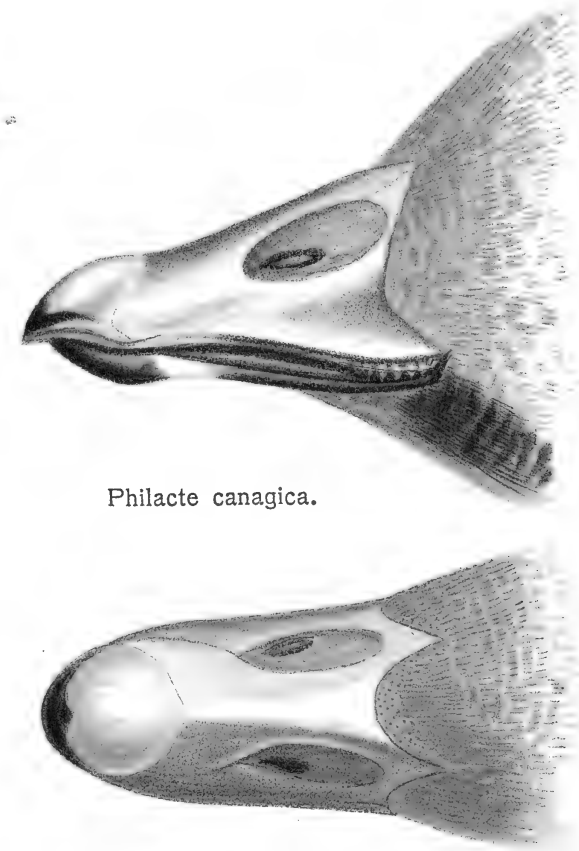
Anser anser.



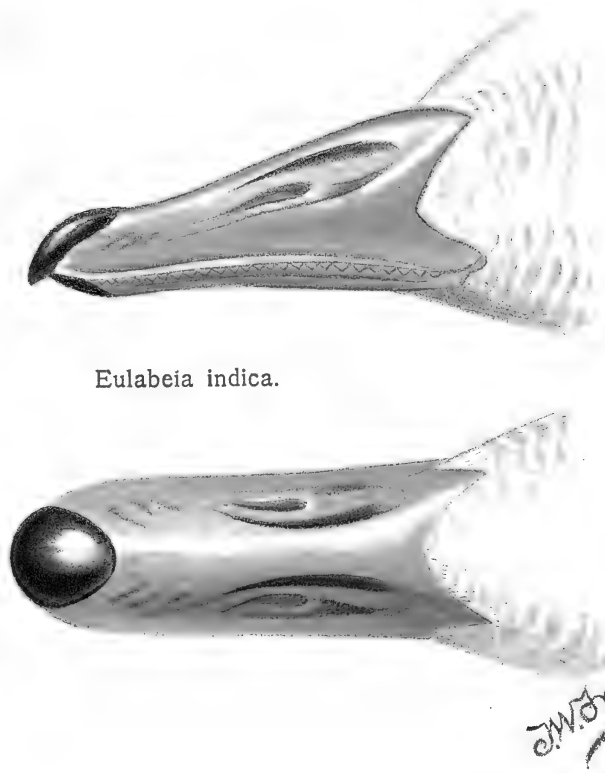
Chen hyperboreus.



Anser finmarchicus.



Philacte canagica.



Eulabeia indica.

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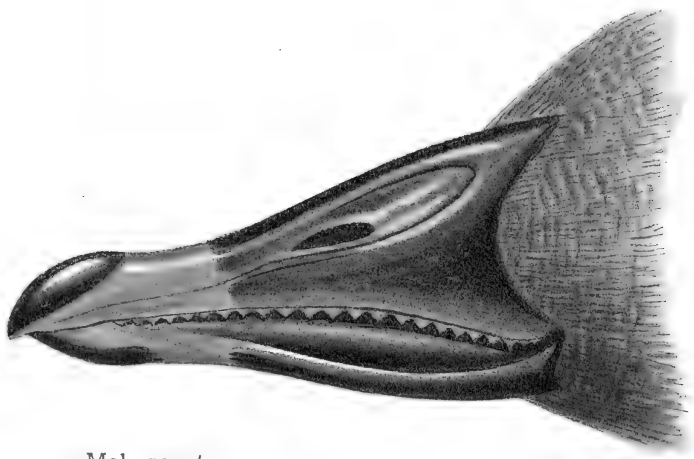
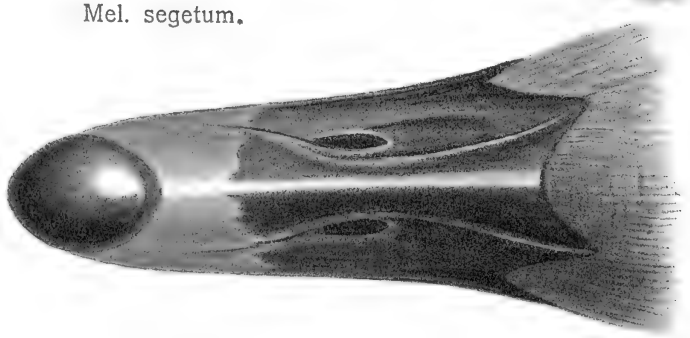
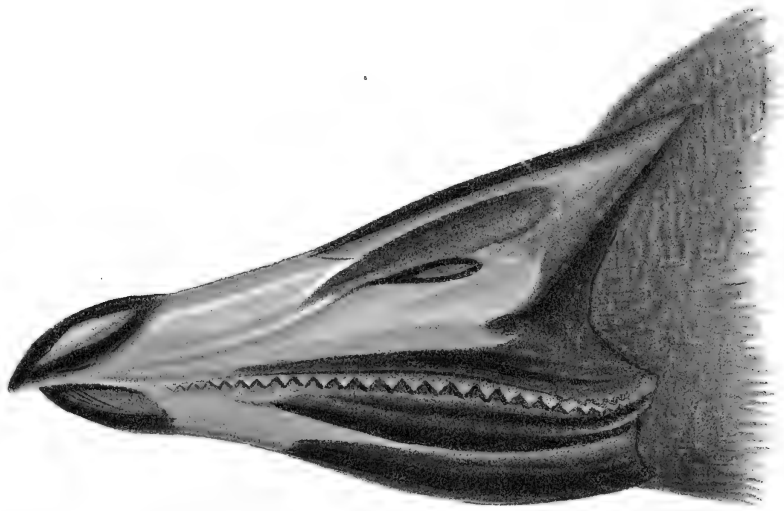
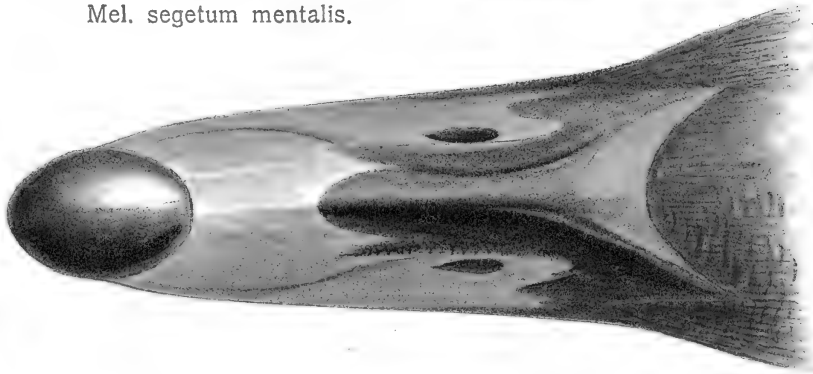


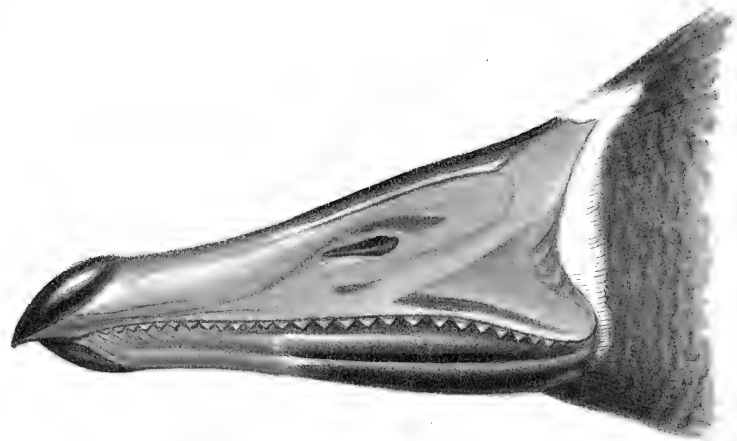
Mel. segetum.



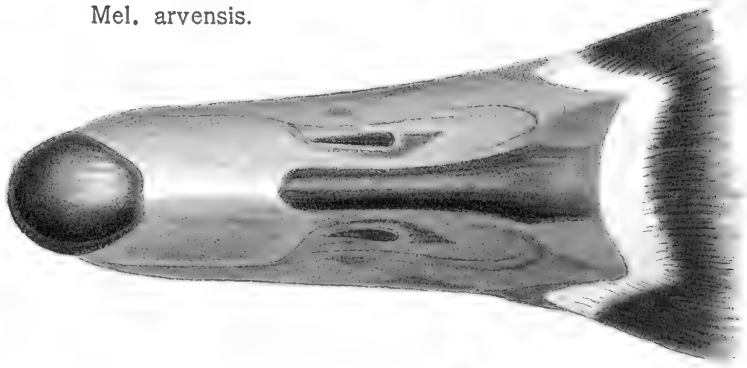


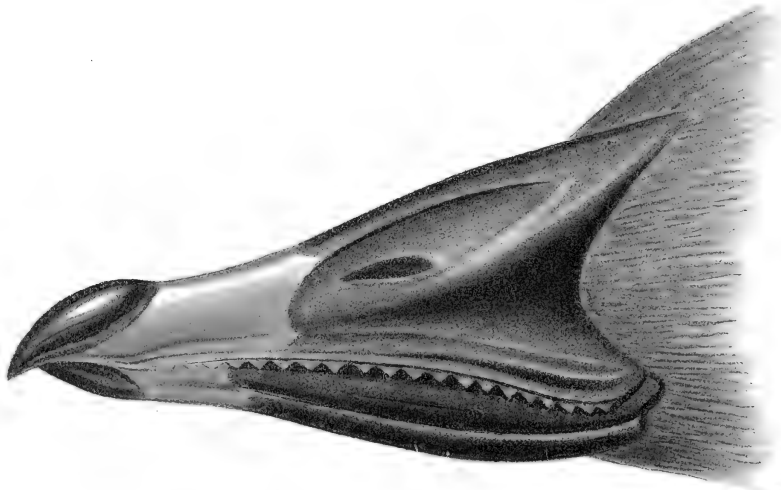
Mel. segetum mentalis.





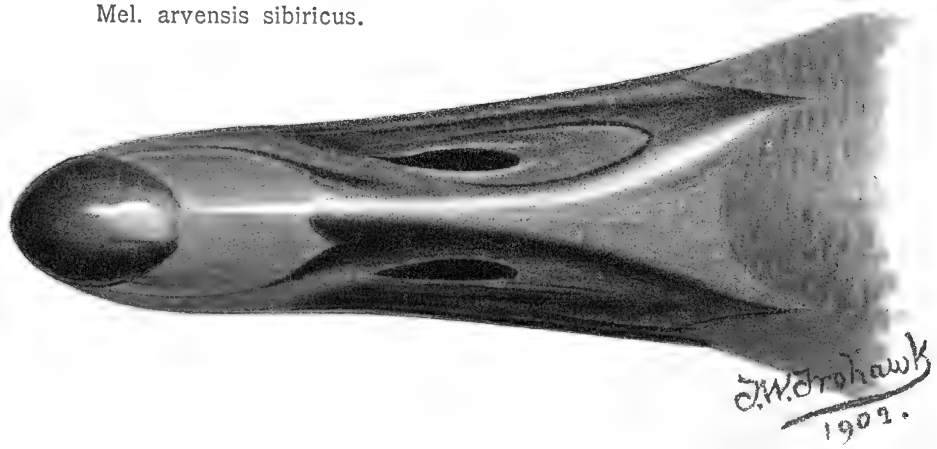
Mel. arvensis.





Mel. segetum serrirostris.

Mel. arvensis sibiricus.



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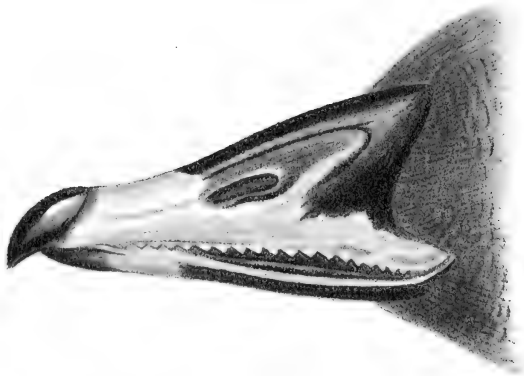
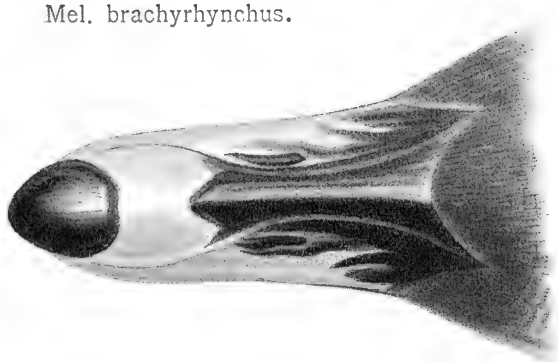
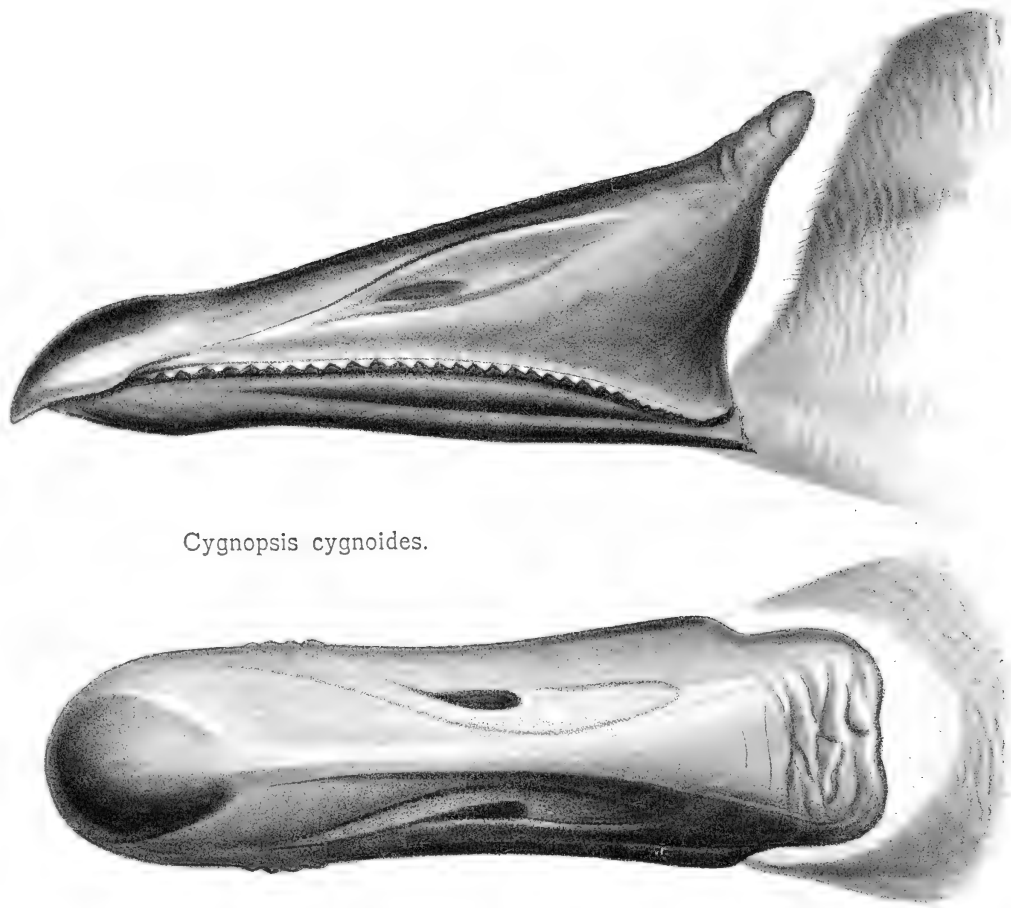
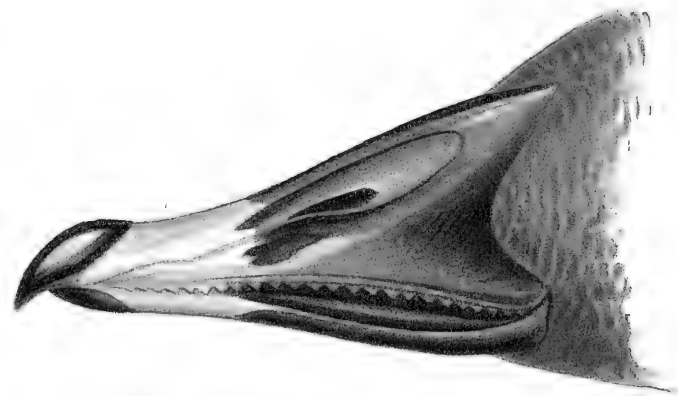


Mel. brachyrhynchus.

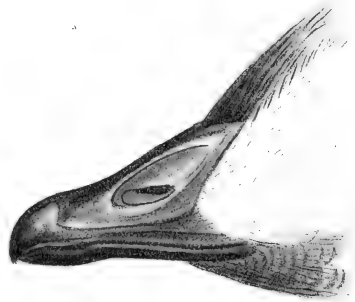




Cygnopsis cygnoides.



Mel. neglectus.



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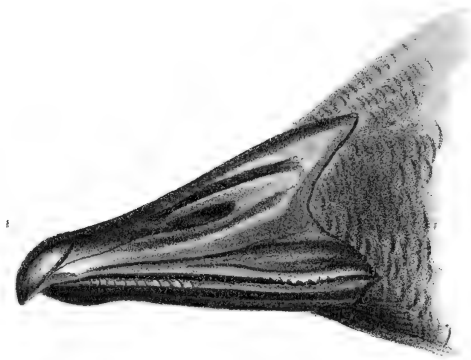
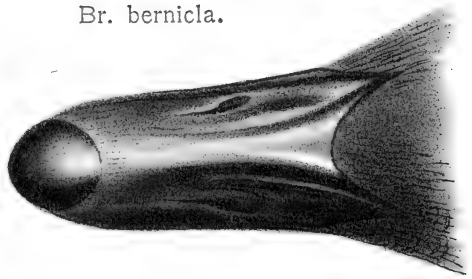
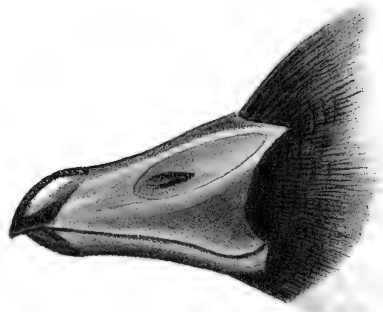
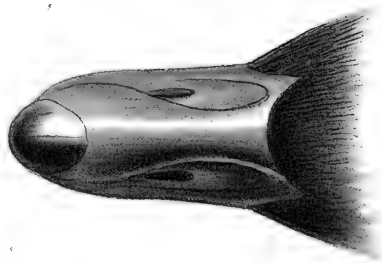


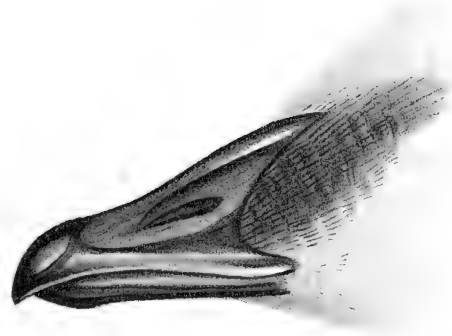
Br. bernicla.



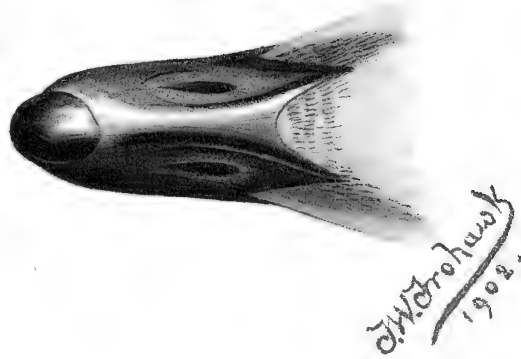


Leuc. hutchinsi.





Leuc. leucopsis.



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