of other quadrupeds, and in greater or less degree according to the different qualities of their food, it was natural to expect some correspondent peculiarities in the gizzards of those birds which feed on grass, to fit them for digesting this kind of food.

With this view the author has examined the gizzards of the goose and swan, in comparison with that of the turkey, which feeds on a different kind of food.

For the purpose of rendering the fibres distinct, so as easily to be traced, the gizzards of each were boiled, after having been previously filled with plaster of Paris. In the turkey the two muscles, of which the gizzard consists, are of unequal strength, that on the left side being considerably stronger than that on the right. These muscles, by their alternate action, produce a constant friction on the contents; for though the direct pressure inwards is very great, the lateral motion occasions the force employed upon the substances contained, to be applied in an oblique direction, as Spallanzani and others have observed.

The internal cavity being of an oval form, like a pullet's egg, rounded on all sides, does not allow the opposite sides ever to come into contact; so that the food is triturated merely by the intermixture of bodies harder than itself.

In the goose and swan, on the contrary, the cavity is flattened, with its edges very thin. The surfaces applied to each other are, however, not plane surfaces; but a concave surface is applied to one that is convex; and in the left side the concavity is above; but the curvature changes, so that on the right side the concavity is below. In these gizzards the horny covering of their surface is much stronger than in the turkey, and rough; so that by a sliding motion of the parts opposed, the food is ground, although they do not admit the intervention of hard substances of a large size, and almost without requiring such assistance.

In the lower part of the œsophagus of these birds, the author observes an enlargement, which he considers peculiar to them, and thinks it answers the purpose of a reservoir, in which the grass is retained, macerated, and prepared, as in ruminating animals, for the subsequent process of rumination.

Observations on Atmospherical Refraction as it affects astronomical Observations; in a Letter from S. Groombridge, *Esq. to the Rev.* Nevil Maskelyne, *D.D. F.R.S. Astronomer Royal. Communicated by the Astronomer Royal.* Read March 28, 1810. [*Phil. Trans.* 1810, *p.* 190.]

Mr. Groombridge being in possession of a transit circle four feet in diameter, made by Troughton, undertook a series of observations upon circumpolar stars, for the purpose of determining the latitude of his observatory.

As his instrument had the advantage of being fixed upon stone piers, which are not liable to partial expansion, and as the size of the instrument itself seemed to him better adapted to determining the real quantity of atmospherical refraction than any which had been before employed for the same purpose, he extended the range of his observations as low down towards his north horizon as his situation would permit. For this purpose he selected fifty stars of different polar distances, and of these he made, upon the whole, upwards of 1000 observations.

The observed zenith distances being first corrected by the usual equations, so as to reduce them all to the same period, January 1, 1807, a correction is next made for refraction, according to Dr. Maskelyne's last precepts, in which the refraction at 45° is estimated at $56\frac{1}{2}''$, with due allowance, as usual, for the states of the barometer and thermometer, as noted at the time of observation.

Since the co-latitude is equal to half the sum of the real zenith distances of any one star that has been observed, both above and beneath the pole, it is evident that the same result should be obtained from stars near the pole, as from those which are more distant, after all the requisite corrections have been rightly made. But since, by the author's observations, his co-latitude deduced from distant stars, which are subject to greater refraction, was found to be about $2\frac{1}{2}''$ greater than from stars near the pole, he presumed that the allowance of $56\frac{1}{2}''$ for mean refraction at 45° was too small. For if both the greater and less refraction be increased in the same ratio, the corrections thus made will be unequal, and their difference may be made to remove the inequality of the co-latitudes, as deduced from the mean of $56\frac{1}{2}''$.

From the mean of 13 stars; which do not pass lower than 56° from the zenith, compared with the mean of 21 stars, between 60° and 78° zenith distance, Mr. Groombridge infers that the mean refraction is really as much as $58''$ and a small fraction; and accordingly, in his table of observations, he gives corrections computed according to this supposition, whereby his column of co-latitudes is rendered uniform, without departing from the law of refraction at different altitudes laid down by Dr. Bradley.

The deductions thus made from observations on the fixed stars, are next compared with those obtained from the meridian altitudes of the sun at the solstices, which he thinks afford satisfactory proof of their correctness; as the latitude of his observatory, by the former method, was found to be 51° 28′ 2″·1, and by the latter 51° 28′ 2″·35.

The author proceeds to ascertain the difference of latitude between the Royal Observatory at Greenwich and his own, by comparison of his observations of the zenith distance of γ Draconis, with some of the same star communicated to him by Dr. Maskelyne; and by similar comparison of zenith distances of other stars observed at the Royal Observatory by Colonel Mudge with the zenith sector.

He next compares the refraction above deduced, with the results of other astronomers. Piazzi, having an instrument which turns in azimuth, has deduced the actual refractions at all distances from the zenith, by means of numerous observations on Procyon, α Lyræ, and Aldebaran, at various altitudes, from 38° to 89° zenith distance, in addition to several circumpolar stars. Piazzi's result is, that the mean refraction at 45° is $57''{\cdot}3$, which is less by eight tenths of a second than that of the author; but by the present French tables it is stated to be $58''{\cdot}2$, which, on the contrary, is rather greater. But beside the difference in the quantity of mean refraction at 45°, Piazzi observes that the law assigned by Bradley does not obtain; for though the actual refractions, so far as 80° from the zenith, are, in fact, greater than was supposed by Bradley, the refractions within the remaining 10° of the horizon are less than he supposed them to be.

In the series of observations given by the author, a similar want of conformity to Bradley's law is observable; and he observes, that the change of difference, from greater to less, takes place at 80° zenith distance, which is the same point of the heavens assigned by Piazzi.

Mathematicians, who have endeavoured to reconcile the known laws of refraction through different media, with the actual quantity deduced from observation, have proved that the refractions vary nearly as the tangents of zenith distance; but in order to reconcile this rule with the fact at low altitudes, they have found it necessary to introduce a correction of the zenith distance, and have invented a formula, consisting of a tangent of the zenith distance, diminished by some multiple of the refraction. The magnitude of this multiple has been estimated differently by different authors. By Simpson it is rated at 2·75; by Dr. Bradley 3; by Bouguer 3·23; by Cassini 3·226. Mr. Groombridge computes that this multiple should be as much as 3·3625.

In addition to the above endeavours to determine the mean refraction, and its variations at different altitudes, the author also considers the corrections which should be made for the states of the barometer and thermometer, and explains the means by which he deduced those that he has adopted, in order that any error therein may be more easily detected.

Extract of a Letter from the Rev. John Brinkley, *D.D. F.R.S.* Andrew's *Professor of Astronomy in the University of Dublin, to the Rev.* Nevil Maskelyne, *D.D. F.R.S. Astronomer Royal, on the annual Parallax of α Lyræ.* Read April 12, 1810. [*Phil. Trans.* 1810, *p.* 204.]

The principal object of Dr. Maskelyne in making this communication, is to inform the Society of a discovery, made by Dr. Brinkley, of the parallax of the annual orbit, which he has ascertained by observations on α Lyræ.