periments have shown that this double reflection does not occasion a great loss of light; and the figure and polish of the silver on glass mirrors are very satisfactory. The observatory possesses this new instrument through the liberality of the well-known patron of French astronomy, M. Bischoffsheim.

In regard to physical observations, M. Egoroff, professor of physics at Warsaw, was occupied at Paris during the months of July and August, as in preceding years, with the spectroscopic study of atmospheric absorption, working with a beam of electric light sent from Mont Valérien to the observatory. In consequence of the decision of Admiral Mouchez to separate special meteorological investigations from the astronomical work of the observatory, meteorological observations of a much higher value are now being made, with the special object of determining the different corrections, of the nature of refraction, to be applied to the astronomical observations. A series of observations is to be made from a captive balloon of such size, that, with ordinary gas, it can, in calm weather, take self-registering barometers, thermometers, and hygrometers up to a height of five hundred, and with pure hydrogen to a height of eight hundred metres. The balloon cannot be well managed if the velocity of the wind exceeds four or five metres per second; but this is not regarded as inconvenient, because it is during complete calm that the greatest abnormal perturbations of astronomical refraction manifest themselves. Simultaneous observations will be made on the meridian of the Paris observatory, north at the observatory of Montmartre, and south at the observatory of Montsouris.

The construction of the great refractor of 16 m. focus, together with its dome 20 m. in diameter, is steadily progressing. The object-glass figured by M. Martin is already complete. The dome is to be of the same dimensions as the Pantheon, and the largest ever attempted. The arrangement for insuring its turning with ease, and which has been adopted for its construction, is that proposed by M. Eiffel. In order to reduce to a minimum the friction of circular rollers, he proposes to float the dome by means of an annular *caisson* plunged in a receptacle of the same form, and filled with a liquid which will not freeze, such as an aqueous solution of chloride of magnesium. At the Paris observatory it is quite necessary that some such arrangement as this should be adopted; for the observatory is situate over the catacombs, one result of which has been, that for many years the pillars of the meridian-circle erected in the gardens have gradually inclined toward the east in consequence of the displacement of the soil. With mechanism of this form for rotating the dome, any probable change of level would not prevent the dome from turning.

The magnetic observatory now being completed will be one of the first order. Six subterranean chambers of constant temperature have been built under the best possible conditions of isolation and stability. An outer wall of nearly 2 m. thickness encloses a rectangular space 40 m. in length and 14 m. wide, completely impervious to moisture. The vaulted roof, 1 m. thick, is covered by earth to the thickness of 2 m., and grass and planks protect the soil from the direct rays of the sun and from frost. The observing chambers can be lighted either by gas, or by reflection from without.

Advantage has been taken of the existence of these chambers by placing in them the clocks from which the time is distributed throughout Paris; but, in spite of all precautions, the chambers are found to be not altogether free from minor trepidations resulting from the traffic of the streets. Apparatus has been constructed, and is now ready for use in investigating the vertical and slow movements of the soil. This will be placed in a gallery in the catacombs 27 m. below the surface.

The erection of an astronomical observatory on the Pic du Midi, at a height of 2,859 m., is engaging the attention of the director. At this elevation, it is said to be easy to read at night by starlight alone, and fifteen stars are visible to the naked eye in the cluster of the Pleiades. It is intended that any astronomer who wishes to make any special researches may take advantage of the observatory on the Pic du Midi.

LETTERS TO THE EDITOR.

The right whale of the North Atlantic.

I have noticed in a late number of your journal a criticism on the last Bulletin of the American museum of natural history. Being away from town, I have not access to works referring to the subject of cetology; but with the aid of notes that I have with me, as well as drawings of the subjects involved, I hope to show conclusively that other views than those taken by the critic are the correct ones.

I shall not attempt to justify the carelessness that permits the presence of typographical errors; but, when an *errata* list accompanies a work, it should have due credit for its intentions.

The writer says, "There are errors of statement of so grave a character as to require notice," and continues, "It would seem, for instance, that only the merest novice in cetology could have been misled," etc. — referring to the identity of the St. Lawrence whales.

Lesson wrote, "What an impenetrable veil covers our knowledge of the Cetacea! Groping in the dark, we advance in a field strewn with thorns." I believe that some in later days, not quite novices, admit a degree of unfamiliarity with the great beasts of the sea. In that view, let us see if 'errors of statement of grave character' have really been made.

The president of the Quebec historical society, Dr. Anderson, with Dr. DeKay's Report on mammalia before him, says, speaking of a large whale that had foundered in the St. Lawrence River, "It turned out to be an aged male, apparently the species Balaena mysticetus. . . . The back was black; the belly, furrowed, presenting the appearance of a clinker-built boat. . . . I concluded, after a careful examination, it answered fully the description given by Dr. DeKay for the mysticetus. . . . As the whale lay upon the beach, he was sixty-five feet long; the fluke of his tail was twelve feet; his jaw, fifteen feet."

This whale was noticed primarily by us for the purpose of directing attention to the fact, that such a great form had really pushed into the fresh-water

stream as far as Quebec, and to show that possibly Professor Flower had misapprehended when he was told of stranded whales in the St. Lawrence; he, in absence of description, naturally regarding them as white Belugas.

Besides this, several alternatives were presented in the absence of the mention of *most distinctive* characters; but no definite statement was hazarded, nor was one intended.

The first paragraph touching on this notice of the St. Lawrence whale, and which is included by the critic as among the 'grave errors of statement,' is as follows: "It is pretty certain that if the creature was really a Balaena, and not a Balaenopter, it was an example of unusual size." As we had no intention of arguing any case, this cannot be regarded as more than courtesy to Dr. Anderson, who had stated his unqualified opinion as above.

The next passage in our text is, "The furrows on the belly naturally suggest the Balaenopters; but it is inferred that there was no dorsal fin." The dorsal adipose fin being an essential feature in the latter, absence of any notice of it naturally seemed strange.

As there was no description of the head, save as related to its length, the baleen not being measured, the only character that suggested strongly the finback was the clinker-built aspect of the belly. In this view the statement of Scoresby might well lead to misapprehension, even by some not wholly novices.

Scoresby says (in his description of the B. mysticetus), "The skin of the body is slightly furrowed, like the water-lines in coarse-laid paper."

The fluke of the tail is described as twelve feet in length. Here, regarding the possible fact of there being *two* flukes to the tail, the total width of the caudal extremity would be twenty-four feet, the actual measurement of a large example of a right whale. That the writer in the bulletin did so regard it is true; but, in the light of after-knowledge, we have no doubt that Dr. Anderson meant to include the whole width as twelve feet.

In the absence of definite features in Dr. Anderson's description, and in view of the absence of any attempt in the bulletin to argue in favor of any one genus or species, we regard it as a subject that hardly calls for criticism. In short, taking the evidence recorded, to our mind it seems to be quite as easy to prove the creature of one genus as the other; and by that we mean that Dr. Anderson's positive statements should not go for nothing. We are not, however, ready to hazard an opinion that the whale was not a fin-back, as we certainly did not in the bulletin.

The next point refers to Scoresby and his drawings. That Scoresby did not portray his subject correctly, so far as relates to the Greenland whale, is, we feel sure, susceptible of demonstration, even if we should omit the opinions of three of the most able cetologists. The critic claims, "That it was the best figure [Scoresby's], if not quite correct in all points, of the species down to 1874, when Scammon's admirable illustration was published, has, I think, hitherto been unquestioned." When we are told that our opinion that Scoresby 'furnished to science an incorrect figure' is 'an error of statement of so grave a character as to require notice,' we answer by quoting from Professors Eschricht and Reinhardt, in their article on Greenland whale, in Ray society's publ., p. 29. It is well known that these distinguished authors are leading cetologists, whose work is edited in English by Professor Flower. The latter, therefore, is supposed to acquiesce in their opinions. These authors say, "We must confess, that as to proportions we confide more in these drawings [referring to Marten's and Zorgdrager's] than Scoresby's, which certainly represents the Greenland whale (B. mysticetus) more slender than it really is."

Besides this, we claim to be able to demonstrate the correctness of our statement by reference to the figures. We have before us those of Scammon, Scoresby, Zorgdrager, and Lacépède, representing the Greenland whale. We also have the Bachstrom figure of nordcaper, published in Lacépède's work. With Capt. Scammon's figure before us, the one admitted by our critic to be an 'admirable illustration,' compare now Zorgdrager's; and we find, that, though rude in finish, it is nearly an exact counterpart of the Scammon figure. We see that the form is bulky, and has a very short 'small,' or caudal region; that its head is of the proportion of one-third the total length of body; its pectoral limbs are situated very closely behind the eye and angle of the mouth, not a quarter of the total length of the 'flipper' distant therefrom, — all of which features are recognized as correct.

Let Scoresby's figure be compared with Zorgdrager's, which we have seen is essentially the same as Scammon's. We see that the form is not only not bulky, with a very short 'small,' or caudal region, but has the body very slender, with an elongated 'small;' the latter being so slender that it is represented whipping the air like the tail of a saurian. Its head is one-fourth of the total length of body, instead of one-third, as in nature, and in the Zorgdrager and Scammon figures. Its pectoral limbs are situated at a distance from the eye and angle of mouth represented by the *total* length of the limbs. It is therefore seen, that, in accordance with all evidence, Scoresby's figure was not correct. Hence it *is* "deplorable that nearly every book published to this day has an illustration copied from Scoresby."

"'Tis true 'tis pity, and pity 'tis 'tis true."

Our critic next attributes unfamiliarity with Scoresby's cetological writings, from the fact that we credit Godman with 'an amount of anatomical knowledge quite unusual.'

The truth is, the edition of Scoresby in our possession does not contain the portion relating to interior anatomy and physiology, and the plates representing the spiracles. It is 'An account of the arctic regions, Edinburgh, 1820.' The work is not before us, but a reference to this edition will verify our statement. Since the matter was prepared for the bulletin, we find that the several pages relating to this portion of Scoresby's description were probably never printed therein. We have, however, found the whole in Sir William Jardine's Naturalists' library, volume on whales, by Col. Hamilton.

In view of this fact, one may venture to claim a degree of immunity from severe criticism, though evidently he may be open to the accusation that 'he is none too familiar with Scoresby's cetological writings,' or at least his various editions.

Not having met with this matter relating to the anatomy and physiology in Scoresby's book, it was but natural to attribute to Godman 'an amount . . . quite unusual.'

A point succeeds this, concerning which we must take issue with the critic. He says, "The fact being that Godman's account is an unaccredited compilation from Scoresby's work, whole pages being taken entire," etc. We find in our edition of Godman's Natural history, instead of 'an unaccredited compilation,' the following: "Having never personally enjoyed opportunities of studying the whale in his native floods, and having derived all we know in relation thereto from Scoresby, we should deem it

injustice to the reader to give this account in any other language than that of the original. We do this without reluctance, as our object is to convey the most accurate knowledge, rather than produce a work exclusively of our own composition. All that follows in relation to the whale is selected from the different works of the accurate and philosophical Scoresby." If the critic's edition of Godman has played false with him, as our edition of Scoresby has with us, perhaps he may think it wise to 'cry quits,' and join with us in throwing out of the case the two slippery points.

It may be proper to add here, that we are familiar with Scoresby's second figure of mysticetus, which is so far improved as to have the 'small' shortened; but unfortunately the first figure, with all its imperfections, is the one that has been brought down to us through every book on natural history.

The reference to Bachstrom's figure of nordcaper is obscure.

It matters not what that figure *is:* it was regarded as one of nordcaper by Cuvier; and he, in comparison with the old figures of mysticetus, which we claim were nearer true than Scoresby's in general proportion, wisely admitted two species.

They were both, as we have said, about equally incorrect; yet they both had certain features that agreed with the descriptions of the two forms. The nordcaper had been described in nearly the same terms by various authors, great stress being laid on its slenderness and mobility. Scoresby now presents his figure, which, instead of being bulky, with a very short 'small,' or caudal region, and a head one-third the total, had quite nearly the proportions of the figure of Bachstrom, received by Cuvier as that of nordcaper, and with no other specific feature to distinguish them.

The mention of inaccuracies, seen near the close of the criticism, is not wholly free from error; for example: the citation touching Col. Hamilton and the Naturalists' library is exactly correct, yet it is noticed as one of the errors that render the historical *résumé* 'seriously defective and misleading.' We are now willing to rest this showing, trusting to the facts herein referred to for our vindication in the face of this grave charge. J. B. HOLDER.

Fortunately for Dr. Holder, he did not state directly and unequivocally that the St. Lawrence whale was a Balaena; but he occupies several pages in trying to explain away the obvious discrepancies in the way of such an identification and in offsetting them with the *possibilities* in its favor, leaving the reader with the conviction that the specimen is cited as, in Dr. Holder's opinion, an instance of the occurrence of a Balaena in the St. Lawrence near Quebec. Indeed, he goes so far as to say, "and the second example [the one here in question] . . . shows that the largest of the right whales [Balaena] have really found their way as far up a fresh-water stream as Quebec and Montreal" (p. 116). Again he says, "This example is valuable for record, 1°, as a specimen of unusual size; 2°, as one of great age; 3°, as one out of its usual habitat in so far as to be quite within fresh water" (p. 115). From the context, the point in doubt seems to be, not whether the species is a Balaena, but whether it is B. cisarctica or B. mysticetus; and the whole tenor of the argument (for such it really is) is fairly open to only this construction, whatever may have been intended. In evidence that my criticism on this point is not groundless, or due to perversity on my part, I may cite Mr. F. W. True's notice (*Scient. lit. gossip*, i. 72) of Dr. Holder's memoir, where the same criticism is made.

As to other points, I will take space to say merely that I regret to notice that Dr. Holder forgets to tell us where Scoresby got his drawings, which, he (Dr. Holder) informs us, 'were evidently ill-considered and taken at second hand,' and to ask for proof that Col. Hamilton wrote the 'Cetacea' of Jardine's 'Naturalists' library.' The copies of the work I have seen are anonymous, but the work is accredited by Gray and other cetologists to Jardine; and some time since, I took pains to satisfy myself that Jardine was the author. As to Godman, I confess to having done him injustice in overlooking his credit to Scoresby, which my friend Dr. Holder appears to have unfortunately only recently discovered; otherwise, doubtless my stricture on this point would not have been called out. J. A. ALLEN.

The Ainos of Japan.

On p. 307 of SCIENCE, D. P. Penhallow objects to my statement of the number of Ainos. It is rather surprising how little he heeds what I said. The numbers he gives are official; i.e., he gives the number of Ainos known to the Japanese government. Therefore he reaches the surprising result, that, with the exception of the Ainos brought over from Saghalien (now about 800), there are but 200 in all the province of Ischicari. That province is about as large as Hitaka (according to Penhallow, with 5,000 to 6,000).

Penhallow gives the Aino population in Kitami, Kushiro, Tokachi, and Teshiwo as ranging from 350 to 1,500 in each, when it is well known that they are full of Ainos, as any one travelling there will see, their villages being thickly scattered along the coast and the banks of all the larger rivers. I should estimate from those seen at such points that there must be more than 50,000 Ainos in all. Taking Penhallow's figures for Iburi and Hitaka as correct, and assuming that the four provinces named above must have as many Ainos as Hitaka, we should have about 26,000 in these five. Granting that Ischicari, Shiribeshi, and Nemuro have also been taken as much too thickly populated, still we must give them 4,000 more than Penhallow allows; i.e., about 6,000.

Now add to them Penhallow's number for Iburi, nearly 4,000, and the small remnant of Oshima, (Penhallow, 250), and lastly for Chishima (not Chisuma) or the Kuriles a minimum of 750, we get 33,000 as the minimum for Yezo. Saghalien having 10,000 to 12,000, and South Kamtchatka 5,000 to 6,000 (perhaps less), there cannot be fewer than 50,000 Ainos altogether. D. BRAUNS.

The Iroquois.

A close study of the Mohawks of Quebec province, Canada, after the plan and in the service of the Bureau of ethnology, reveals several facts hitherto unnoticed in the various histories of the Iroquois.

Isolated by the early Jesuit fathers from their former Pagan friends and surroundings, every trace of their old folk-lore and of their Pagan customs has disappeared. The division and nomenclature of their gentes differ materially from those of any of the other tribes, and present an interesting field of inquiry. The Mohawk gentes, as given by Morgan, are the wolf, bear, and turtle. Among the Mohawks at Oka, we find, in addition to those, the lark and the eel, while at Caughnawaga they are the bear, wolf, calumet, rock, lark, turtle, and dove.

Among the wampum belts of this tribe is a very fine one, upon which the calumet is figured in white