maximum of from the seventh to the eighth magnitude, reached between Sept. 22 and 24, falling off suddenly on either side; for on Sept. 21 the comet was 'very faint,' with 'a slight condensation,' and on the 28th it was tenth to eleventh magnitude. Bigourdan says, "It had for some time a brilliancy thirty or forty times what might have been expected, — a fact difficult to explain on the theory that comets have no light of their own."

As regards any variability at its former appearance, the observations of 1812 are not sufficiently precise to furnish conclusive evidence.

A rough sketch of the comet, as seen with the 26-inch equatorial of the Naval observatory, Washington, was made on Sept. 26, 1883; and by permission of the superintendent of the observatory, Rear-Admiral R. W. Shufeldt, it is here given, with the observer's note. "Sept. 26.39, 1883; — observer, Winlock; —

PONS-BROOKS COMET, SEPT. 26, 1883.

26-inch equatorial, magnifying power 183. The comet appeared as an oval, nebulous mass, with a fairly well defined stellar nucleus, somewhat elongated in the *preceding following* direction, the nucleus being situated at about the centre of the nebulosity. The whole mass was some 6′ or 8′ in diameter."

The spectrum of the comet was examined by Konkoly,[1] Sept. 27, 1883. It consisted of three extremely faint bands, — the middle one brightest, the third (from the red end) next, and the one towards the red faintest. The bands ended in points, and were unequal in length. They sometimes lighted up for one or two seconds; and at these times they seemed to be much shorter than ordinarily, — a phenomenon quite new to the observer.

From the similarity of the orbits of the comets of 1812 and 1846, IV., Kirkwood has suggested (*Amer. journ. sc.*, 2d series, xlviii. 255) that they were doubtless members of a cometary system, and were brought into the solar system 695 years before the Christian era by the influence of Neptune. Schulhof and Bossert, in pointing out an error in Kirkwood's calculation, modifying somewhat his conclusion, say that the remarkable resemblance between the orbits of these comets indicates that there was originally some intimate connection between them. Indeed, these two comets, and the comets of 1815, 1847, V. (Brorsen), and 1852, IV. (Westphal), seem to belong to the same family.

As to the proper designation of this comet of Pons and of Brooks, authorities and precedents differ. In *The observatory* for November, 1883, Mr. W. T. Lynn writes, "I presume the designation Pons-Brooks's comet is understood to be only provisional. According to rule, it should be Pons's comet; . . . its permanent name must therefore be 'Pons's long-period comet,' or 'Pons's periodical comet of 1812.'" The shortest designation seems likely to prevail; and doubtless the comet will be known hereafter as the 'Pons-Brooks comet,' or perhaps simply as the 'Comet of 1812,' it being the only comet that was seen in that year.

W. C. WINLOCK.

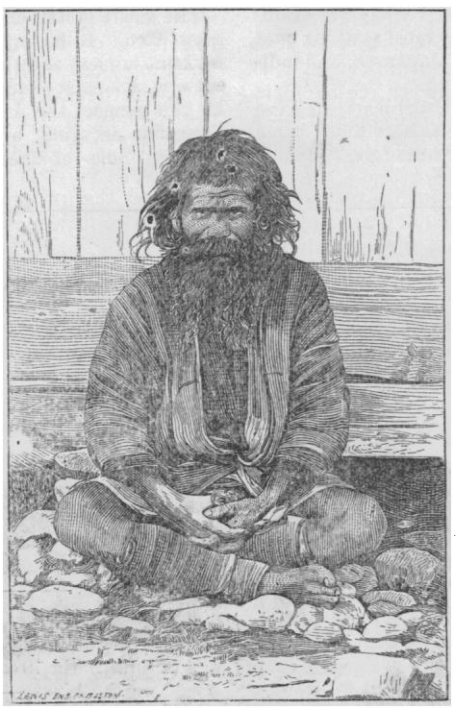
[1] *Astron. nachr.*, No. 2547. *The observatory*, November, 1883, 333.

THE AINOS OF YEZO.[1]

ALTHOUGH the literature relating to the Island of Yezo, and the Ainos, — the inhabitants of this island as well as the southern half of Saghalien (or Karafuto), the Kurile Islands, and the southern extremity of Kamtchatka, — has increased much in recent years, still a description of the same, based upon personal observation, may be of use in explaining the many contradictory reports and opinions of ethnologists. Two facts should be borne in mind, — first, that the Ainos are not, even in the most remote way, to be classed with the dark races; and, second, that they are in no way related with their southern neighbors, the Japanese. With regard to their color, I must remark, that I have not found the Ainos of either sex darker than many Europeans: indeed, it is not rare to find in southern and eastern Europe darker individuals than are to be seen among the aborigines of Yezo. The assertion that the Ainos are dark brown, or even black, is sometimes made by those who do not take into consideration the fact that superstition prevents them from washing, and that consequently their complexion appears at times much darker than it really is. The real color, which may be best seen to advantage among the Ainos living on the seashore, is a little lighter, and less reddish, than that of the Japanese. The development of hair is somewhat remarkable: in the case of the men it covers the entire body to about the extent seen in very hairy Europeans. The beard is luxuriant and beautiful: the women imitate it by tattooing. The curly or wavy

[1] By Professor BRAUNS of Halle. Translated from the memoirs of the Berlin anthropological society.

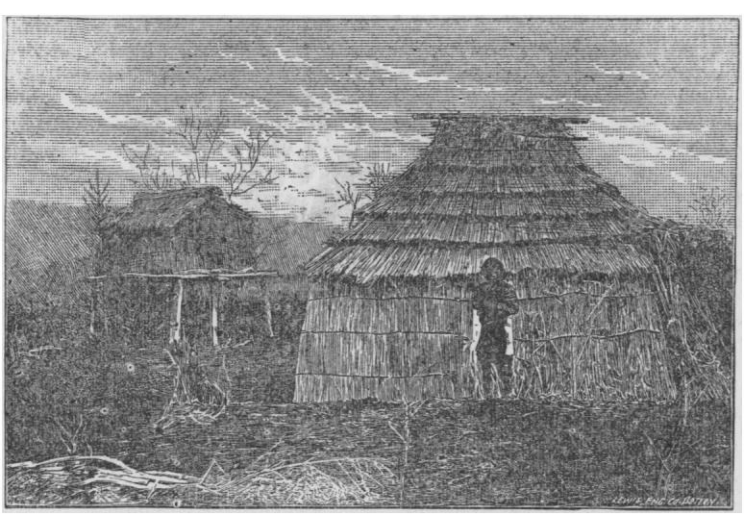
character of the hair of the head is quite striking. The physique is much better than that of the Japanese; the thigh is not so strikingly shortened; and the muscles are more strongly developed, while there is a weaker development of subcutaneous adipose tissue. The physiognomy and cranial conformation are also very different. The eyes are more deeply set than in the Japanese; and, as with us, they are shaded by heavy brows. The orbits, as shown by the skeleton of the face, are less high; and therefore the lids are horizontal, except in some hybrids. In contrast with the Japanese race, the forehead is straight; prognathism, when present, is very slight; and the nose and chin are generally well developed. The facial expression differs also from that of the Japanese: it indicates a certain fearlessness, joined with ingenuousness and a happy disposition. The intellectual characteristics correspond, as might be expected, to the impression produced by external features. As has often been noted, the generous and respectful hospitality of the Ainos never fails to make a more favorable impression on the traveller than is received among the Japanese. In the southwestern parts of the island the character changes somewhat under the influence of the dominant race; and here hybrids are quite numerous. The latter fact has doubtless given rise to erroneous opinions as to the affinities of the two races; for no one would assert a relationship of language, except travellers who knew nothing of the language of either race, and who regarded the Japanese language, which is spoken fluently by the Ainos, as the vernacular of the Ainos. All those who (as Dawidoff, Klaproth, Dobrotworsky, Pfizmaier, v. Siebold, Scheube, Batchelor, Miss Bird) have prepared larger or smaller Aino vocabularies have escaped this error.



AN AINO MAN.

These observations were forced upon me on my first acquaintance with the Ainos in and around Sapporo, where I learned to know, also, the Ainos that were brought from Saghalien to Yezo at the time the former island was ceded to Russia. My conclusions were further supplemented and confirmed through a festival instituted by the government of Sapporo (July 9, 1881), in order to show me, as they said, the earlier conditions of the island, as well as the products of modern civilization.

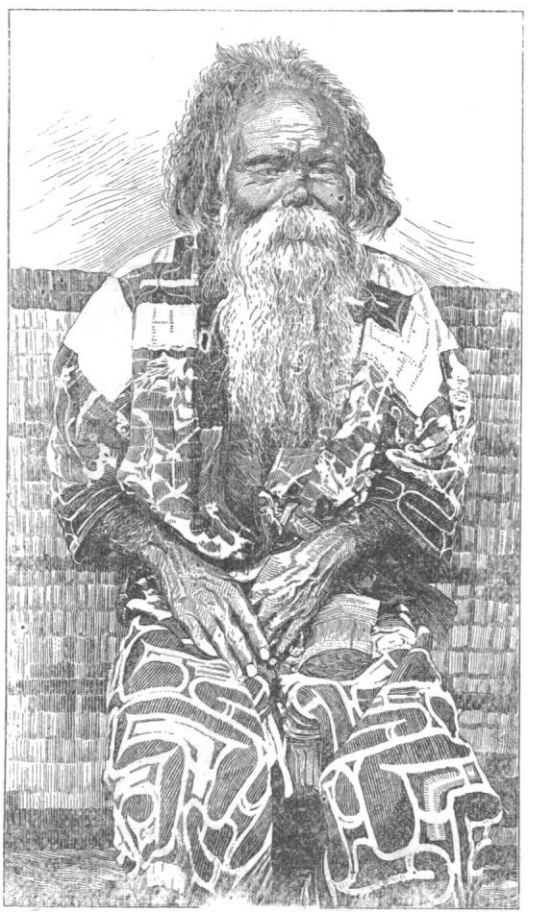
At one end of a large hall, in which we were seated, were seen a number of Saghalien Ainos regaling themselves with saké (rice-wine) under the mellow radiance of oriental lamps. Upon a signal to begin, a young man arose, and led on the women to a round dance, while the older men remained seated. The women, with their faces turned toward the centre of the circle, alternately prostrated themselves and arose, at the same time festively moving onward in the circle. Picturesque as was their costume, consisting of long robes made from the bast of the elm, and metal girdles on which hung carved knife or sickle scabbards, this dance was



AINO HUT.

of inconsiderable interest, in comparison to the soft, melancholy, but melodious music, with its perfect time, which accompanied it. This singing would not have surprised me in the least in Norway, for example; but here it appeared in the most striking contrast with similar efforts of the Japanese, and indicated quite a different cast of mind.

In the vicinity of Sapporo was Juishikari, an Aino village of especial interest. It was here that I came to know the construction of their huts (great squares with smaller additions, all hung with rushes and reeds), many of their customs, their touching adhesion to their old nature-worship, their worship of the sun by the *Inawo* (a sacred staff frilled with shavings pendent from its upper end, and placed in the eastern window of the hut), and their fear of the dead. Their food consists mainly of millet and salted salmon.



AN OLD AINO.

The intelligence of the Ainos is by no means small. They learn the Japanese language very easily, accustom themselves very readily to all innovations which are not in conflict with their religious conceptions, occasionally make improvements, and are ready to answer questions in a precise manner. They never betray their age, and pretend not to know it. With this exception, I learned every thing I wished from them. I obtained, for example, a detailed account of their terms for different colors. After what I had seen, I was not surprised to find that these terms quite conformed to our own, and deviated fundamentally from those of the Japanese. The Japanese have only one word for *blue* and *green;* while the Ainos have distinct names for both colors, which often appear to be confounded when interpreted by the Japanese.

In Saru (or Sara) I had an opportunity to see all of an ancient state organization that has survived the introduction of a village government. Here I found the seat of the chief among the village elders, which was formerly located somewhat farther in the interior, at Biratori or Piratoru. The chief was regarded by the Ainos as a sort of king. Under Japanese domination his power and rank were lost.

The mode of travelling has been well described by Miss Bird. It is impossible to make any progress without horses; and these, although not of the meanest sort, are most shamefully abused by the Japanese. In this respect the Ainos generally prove useful and agreeable servants, but they are often the too subservient tools of their masters. However, I have never seen the Ainos abuse their horses, their only domestic animals, in the reckless and brutal manner observed among the Japanese: indeed, I have witnessed on many occasions quite the opposite mode of treatment.

In my journeys along the coast, I became convinced that the population of the Ainos had been under-estimated, just as that of the Japanese had been over-estimated. While the number of the latter is certainly less than a hundred thousand, instead of more, as officially reported, the number of the Ainos (said to be eighteen thousand) must be trebled in order to reach approximately accurate figures. The erroneous estimate of the Japanese government is explained by the fact that it takes no account of the large number of Aino villages on the large rivers of remote parts of the island, and particularly along the coast, but is based on the relation of the square surfaces of known and unknown parts. In some of the better known parts of the island, especially in the south-west, the Ainos have been completely dislodged; and in the mixed districts their number has also been much reduced.

From all these observations, as well as from the traditions of the Ainos, in which are ever-recurring laments for a better past, and from many peculiarities in their customs (e.g., loss of the use of really good weapons, the poisoning of the arrows and snares for beasts of the chase, particularly bears), we must conclude that the Ainos are to be classed with those peoples that have earlier been more richly supplied

with the implements of civilization, but have become degraded intellectually through isolation. Prehistoric discoveries, particularly those made in the region of Otaru, on the west coast of the island, favor this view. The pits found there for dwellings indicate that the Ainos came from the north to Yezo. The shell-heaps contain, besides very elegant potsherds, many stone implements, especially obsidian heads of lances and arrows, and ornaments of different kinds, as stone-beads and the like. In all these respects the shell-heaps are distinguished from those found throughout Japan, from latitude 39° north to the southernmost point of the coast of Kiushiu, within which limits the shell-heaps are destitute of ornaments, poor in stone implements, and entirely without obsidian. These facts point to a higher civilization of the Aino race, and at the same time refute the assumption that the Ainos formerly settled a large part of the main island (Nipon), — an assumption erroneously supposed by some to be supported by prehistoric discoveries. As there is no near relationship between the Ainos and the Giljaks of North Saghalien, who are less hairy, more prognathous, and more like the Tchuktchi race, we must assume that the Ainos were displaced by the Giljaks, and that their nearest relatives, judging from important analogies of language, and especially from their 'naturell,' are to be sought among the Kaoli of northern Corea (Oppert's Caucasian type of Koreans). The latter have symmetrical features and luxuriant beards, and are therefore called 'bearded barbarians' by the Japanese. They stand to the inhabitants of southern Corea in many respects as the Ainos to the Japanese. The Kaoli have had, to be sure, a history very different from that of the Ainos; for they became a civilized people, while the Ainos in the primeval forests of Yezo became more and more uncivilized. This fact is not opposed to the assumption of a kinship of the two races; and this assumption is supported not only by the particulars already alluded to, and the undeniable capacity of the Ainos for greater intellectual activity than they now exhibit, but also by the fact, that, notwithstanding the developed culture of the Coreans, certain things (e.g., the lance-shaped turrets on grave monuments) recur which remind one of Yezo. Besides, the traditions of the Kaoli, and certain names of places in the southern part of Amur (on the Sungari and its south-eastern tributaries), point to earlier dwelling-places of the race. From here the Ainos probably spread over the lower part of Amur and Saghalien. Other attempts to bring the Ainos and the North-Coreans into close relationship with other peoples are too hypothetical to require mention here. It is certainly to be hoped, but unfortunately it can hardly be expected, that the silent but eloquent appeal for friendly sympathy which the hearty greeting of the Ainos and the melancholy look given to strangers seem to make clear, may meet with some practical response: at all events, we should not withhold our most cordial good will from these sons of the primeval forests of our temperate zone, who are unquestionably the most peaceful and good-natured of all the so-called 'savages.'

THE HOT BLAST IN MAKING IRON.

At the last few meetings of the Iron and steel institute of Great Britain very important papers have been presented and discussed, showing the direction in which competition has brought about economy in iron-manufacture. These papers, notably those of Messrs. Cochrane, Hawdon, Bell, Cowper, and Howson, give to the technical reader a very good idea of the latest opinions of the foremost iron-makers of England.

The institute held its September meeting in Middlesborough, — the place in which it was organized fourteen years ago. This anniversary naturally led to some general reflections on the progress made in that time, which can be appreciated by the general public. The only drawback to the discussions was the absence, owing to illness, of Mr. I. Lowthian Bell, who has been present at all the previous meetings.

In 1828 Mr. J. B. Neilson patented a process for heating the air before it was blown into the blast-furnace, claiming that a gain in economy of working was the result. The idea was received with disbelief in most quarters. A little later Mr. Neilson proved conclusively to all that one hundred pounds of coal burned in heating the air for the blast were able to save three hundred to four hundred pounds of the fuel used within the furnace. The first step was made, and the iron-makers had to accept the consequences.

From this small beginning the tide of invention and enterprise went on, until the air used for blast was no longer heated by coal burned for the purpose, but by the combustion of what were formerly waste gases issuing from the top of the furnace. One improvement after another was introduced, until the temperature of the blast was raised to 900° F., and even to 1000° F. At this point it seemed that the metal pipes used in the stoves for heating had reached their limit of endurance; and a portion of the iron-making world made up their minds that greater heat than this could not be economically maintained, and that, even if the question of obtaining the heat was solved, there was still a balance of chemical reactions within the furnace which would prevent the greater heat from being advantageous.

Meanwhile, by the use of the Siemens regenerator principle, two different inventors, Cowper and Whitwell, each manufactured stoves which contained fire-brick chambers, within which the waste gases burned for a period, until the fire-bricks were at a red heat. The gases were then turned off to the alternate stove, and the air for the blast-furnace was driven in through the heated stove until the other one had become sufficiently heated. The interchange was again made, and so on. These various devices have resulted in the production of a blast of air for the furnace heated up to 1600° F., or even to 1700° F.

Now let us see what has been the result of this change. The blast-furnaces of 1869 produced, on an average, a little over 180 tons of iron per week. To-