WHALES AND WHALEBONE.

We present in this issue a series of diagrams taken from actual measurements of the Greenland whale (*balæna mysticetus*), showing the manner in which the whalebone, so-called, is arranged in the head; and also a full length portrait of the animal from which the drawings were made. For these illustrations we are indebted to *Land and Water*.

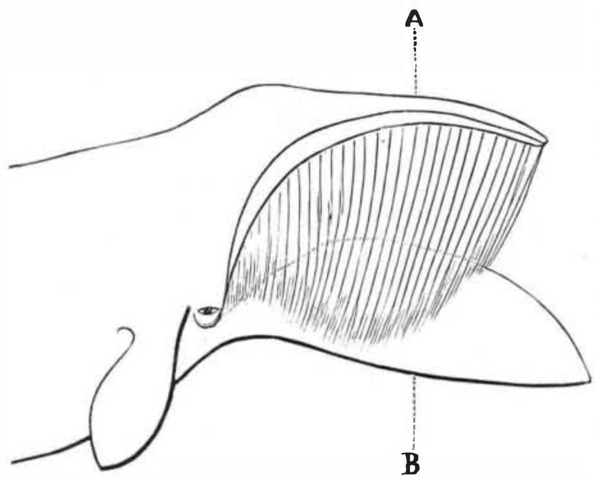


Fig. 1.—Position of the whalebone when the Whale is feeding, mouth open. A, Crown Bone. B, Lower Jaw.

The mode of the progressive growth of the baleen, or whalebone of commerce, is a modification of the design adopted in the tooth of the rabbit or the tusk of the elephant. The baleen is wrongly called whalebone. It certainly comes out of the whale, but there is no bone whatever in its composition. It is composed of hardened hairs which are united one to the other by a kind of animal glue.

The principal food of the Greenland whale consists of a small crustacea not larger than the common house fly, which is found in greatest abundance when the temperature of the sea is from 34° to 35° Fah., the ordinary temperature among ice being 29°, the color of the water varying from dark brown to olive green and clear blue, the blue water being the coldest. To catch them teeth would not be of the least use to him. The only thing to be of use would be a sieve. Aristotle first remarked this fact. "*Mysticetus etiam pilas in ore intus habet vice dentium suis setis similes*"—"The whale has hairs in his mouth instead of teeth, like the hairs of a pig." On this Professor Owen remarks: "To a person looking into the mouth of a stranded whale the concavity of the palates would appear to be beset with coarse hair." The species of *balænoptera*, which frequents the Mediterranean, might have afforded to the father of natural history the subject of his philosophical comparison.

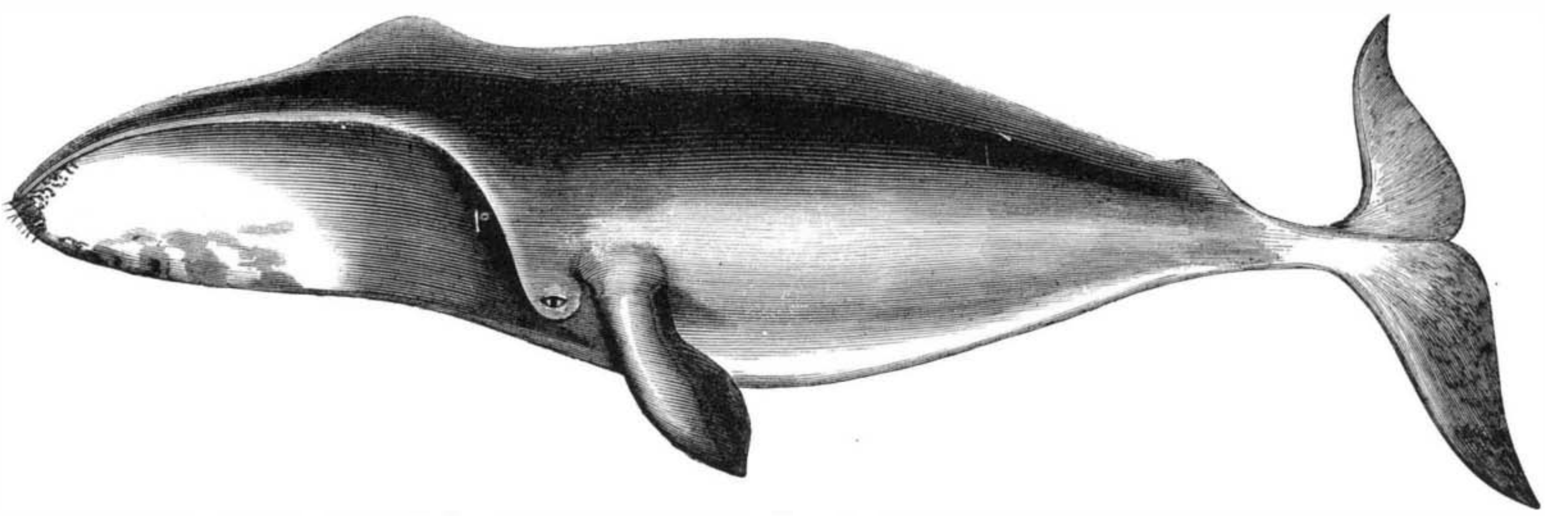


Fig. 5.—WHALEBONE WHALE ("BALÆNA MYSTICETUS") OF THE GREENLAND SEAS.

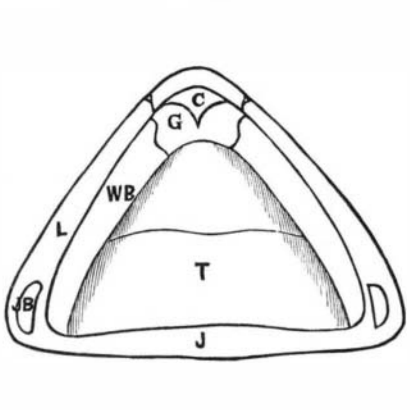


Fig. 3.—Section of Whale's Mouth shut. C, Crown Bone. G, Gum. WB, Whalebone. T, Tongue. L, Lips. J B, Jawbone.

Fig. 1 shows the mouth open and the position of the whalebone when the animal is feeding; it is drawn to a scale, and is a good representation of its appearance. It will be noticed that the correct number of slips of whalebone, which amount to 300 on each side of the head, are not filled in, only a few lines being drawn, showing the direction they take toward the lower jaw when the mouth is open. The number of blades of whalebone in a whale's head have been counted and found to be 286 on the left and 289 on the right side of the head. Along the middle of the crown bone the blades of whalebone are separated from each other by three quarters of an inch of gum, but the interval decreases both toward the nose end and throat to a quarter of an inch. The gum is always white; in substance it resembles the hoof of a horse, but softer. It is easily cut with a knife or broken by the hand, and is tasteless. The whalebone representing the palate is lined inside the mouth with hair, for the purpose of covering the spaces between the slips, and preventing the food on which the whale subsists from escaping; this hair is short at the root of the mouth, but is from twelve to twenty inches long at the points of the whalebone. This it requires to be, because when the mouth is opened the bone springs forward, and the spaces are greatest at the points. Hitherto it was believed that the whalebone had room to hang perpendicularly from the roof of the mouth to the lower jaw when the mouth was shut, but such is not the case. The bone is arranged, as will be seen from the sketch, to reach from the upper to the lower jaw when the mouth is open; were it otherwise, the whale would not be able to catch its food; it would all escape underneath the points of the whalebone.

Fig. 2 shows the position of the whalebone when the mouth is shut. The dotted lines show the jaw bone, and the black the whalebone curving toward the throat. In the first figure it will be observed that the line formed by the lower ends of the whalebone blades is hollowed out near the throat, in consequence of the shortness of the blades at this spot. This shows that it is for the purpose of allowing room for the points of the whalebone to lie in when the mouth is shut. The whale has no muscular power over its whalebone, any more than other animals have over their teeth. When the animal opens its mouth to feed, the whalebone springs forward and downward, so as to fill the mouth entirely; when in the act of shutting it again, the whalebone being pointed slightly toward the throat, the lower jaw catches it and carries it up into the hollow before described.

Fig. 3 is a cross section, cut half way between the blow holes and nose end, showing the mouth shut, and the arrangement of the lips, jaw bones, tongue, and whalebone.

Fig. 4. is the same section showing the mouth open. It conveys a good idea of the great capacity of the mouth, when open compared with the comparatively small space it has to hold the whalebone in when the mouth is shut.

Fig. 5 is the whale from which these measurements were taken, and is said to be the best representation of the *balæna mysticetus* yet made. The dimensions are as follows:

	Ft.	In.
Length from nose to tail	47	0
Length of head from nose to eye	17	8
Breadth of body between the fins	11	0
Breadth of head across the jaw bones	9	3
Breadth of lip, including jaw bone	5	5
Gape	10	8
Breadth of tail	20	0
Length of whalebone	10	1

These measurements are of special interest and value in view of the absence heretofore of similarly careful and detailed information. They are taken from a specimen captured last year by Captain David Gray.

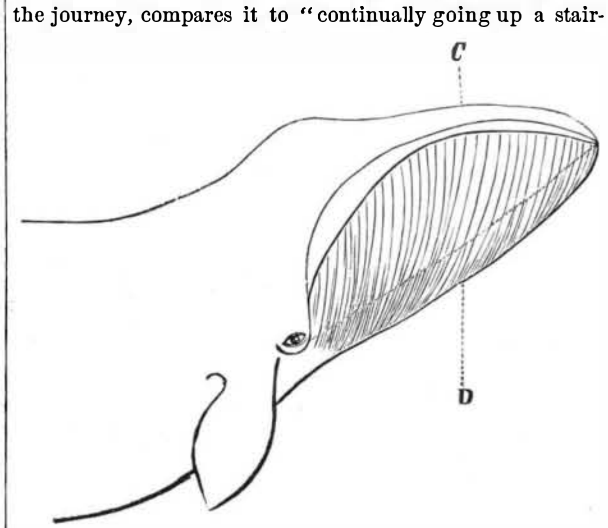


Fig. 2.—Mouth of Whale shut. The plates of whalebone packed away by the action of the lower jaw. C, Crown Bone. D, Lower Jaw.

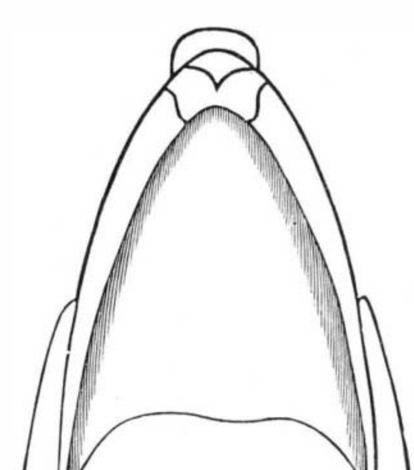


Fig. 4.—Section of Whale's Mouth when open.

Longevity of Trees.

From observations made on specimens still in existence, the longevity of various trees has been estimated to be, in round numbers, as follows: Deciduous cypress, 6,000 years; baobab trees, 5,000; dragon tree, 5,000; yew, 3,000; cedar of Lebanon, 3,000; "great trees" of California, 3,000; chestnut, 3,000; olive, 2,500; oak, 1,600; orange, 1,500; Oriental plane, 1,200; cabbage palm, 700; lime, 600; ash, 400; cocoanut palm, 300; pear, 300; apple, 200; Brazil wine palm, 150; Scotch fir, 100, and the balm of Gilead about 50 years. Such examples are quite sufficient to prove the truth of a remark of Schleiden's that there seems to be "a possibility of a compound plant living on without end."

The Latest Overland Journey through China to India.

Lieut. Gill, an English officer, has lately completed a successful journey through China to India. He left Shanghai in February, 1877, and arrived in December at Rangoon in British Burmah. Reference being made to the geographical positions of the principal places visited, as Hankow, Sung-pan-ting on the borders of Coconoor, Bathang, Talifoo, and Bhamo, it will be seen that he traveled in a southwesterly direction, following the course of the Yang-tse-Kiang into Thibet, and then moved southward. During the most difficult and perilous part of the journey, namely, from Cheng-tu to Burmah overland, he was accompanied by Mr. Mesney of the Chinese service. Mr. Gill, speaking of this part of the journey, compares it to "continually going up a staircase." Roads there were none, the way consisting of mere tracks through a rocky, mountainous country. In the neighborhood of Bathang, which is almost in the thirtieth degree of latitude and quite on the borders of Thibet, ranges were crossed some 15,600 feet high. The most common tree near Bathang is the pine, which in some places was seen in magnificent forests, and the trunks of many of which are three feet in diameter.

In the first part of the journey, after leaving Hankow, which is an open port on the Yang-tse-Kiang, and a four days' journey by steamer from Shanghai, he visited Tsi-liut-sing and examined the fire wells there. These wells go down some 3,000 feet below the surface, and an inflammable gas finds its way out of them. There are also brine wells, and these go down to about the same depth. The natives manufacture excellent salt of the brine. On the way from Mandalay in Burmah to Rangoon, the travelers observed a marked difference between the two political sections of the country—Native and British Burmah. In the latter were cultivated fields, pleasant homesteads, and contented people, which contrasted strangely with the state of things in the former.

New Mechanical Inventions.

An improved Machine for Separating Fur from Pelts or Hides has been invented by Mr. Samuel M. Ball, of Fanwood, N. J. In this machine the fur is removed from the skin by a combination of pickers, carrying aprons, and separating screens, arranged in a compact manner. The machine is cheap as well as simple.

Mr. Gideon McBride, of Dover Hill, Ind., has invented an improved Tellurian for the use of schools, etc., which in a simple manner illustrates the elliptic orbit of the earth around the sun and that of the moon around the earth, together with all the phenomena resulting from the relation of these bodies to each other.

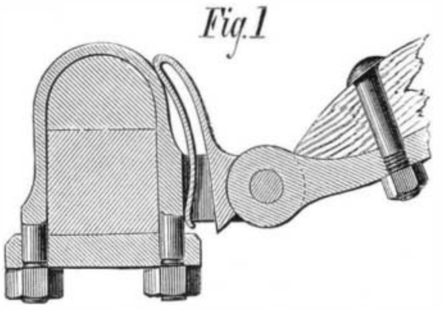
Mr. Lorenzo Meeker, of Oswego, N. Y., has invented an improved Lifting Jack. This has a peculiar construction of a clutch and lever for lifting the load, in combination with a clutch for sustaining it during the alternate movement of the lifting clutch, and differs from other lifting jacks in the construction and arrangement of the sustaining clutch and lever, and in the devices for disengaging the clutch from the bar when it is desired to retract or lower the latter.

In a new Millstone Gearing devised by Mr. Garrett W. Schreurs, of Muscatine, Iowa, the spindle of the runner stone is so stepped and geared that its motion can be instantly stopped at pleasure or in event of an accident.

BEARD'S THILL COUPLING.

The annexed engravings represent a new invention designed to prevent carriage thills from rattling. It consists of

Fig. 1



a steel spring, and the manner of its operation will be seen at a glance from our engravings. It is claimed that this spring is neat, cheap, effective, and far more durable than rubber. It can be inserted without uncoupling the thill or removing any part of the vehicle. Fig. 1 is a section of the entire device, and Fig. 2 shows the spring separate. It was patented October 30, 1877, and is sold by Luke Beard, 75 Hubbard avenue, North Cambridge, Mass.

Fig. 2

A Telephonic Alarm.

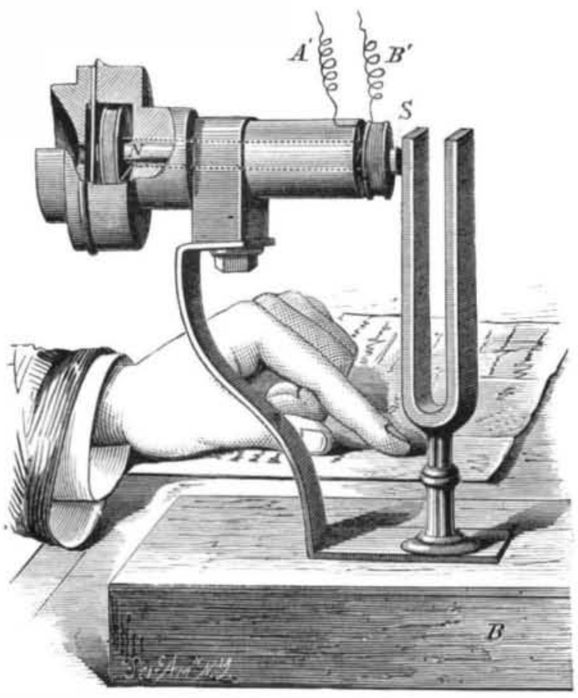
The speaking of the telephone is admittedly so weak that it can only be caught by keeping the instrument in immediate contact with the ear. Hence there is transmitted through the telephone in its present form no sound which would be intense enough to announce to any one who was in a large room, and who did not hold the telephone close to his ear, that a message was about to be sent from the transmitting station. The consequence is that a warning apparatus must be attached to the telephone, so that there may be no fear of missing a projected telephonic conversation.

It is clear that the conducting wire of a telephone can be used to sound a bell as an alarm by means of a current from a galvanic battery, and thereby the defect referred to would be supplied. But the necessary apparatus would considerably raise the price of fitting up a telephone apparatus, and besides, one most important property of the telephone, viz., producing the required electric current automatically, would be partly lost. I have, then, invented another warning apparatus, which, I believe, is quite workable.

Hitherto telephones have been so constructed that only one pole (N in the figure) of the magnet is effective; I now use also the second pole, S, by providing it with a coil of wire, which is simply inserted in the circuit behind the first coil. (The dotted lines in the figure will explain this connection; the two ends A′ and B′ are connected with the binding screws fastened to the telephone; from this the circuit goes to the second telephone.) Before this pole of the magnet a tuning-fork, A, may be very easily set up, which, with the telephone, is simply fixed on a resonance case, B; this arrangement should be made both at the transmitting and receiving stations, and both forks should be in unison. If now the sending station wish to signal that a conversation is to be begun, the fork of that place will be sounded with a fiddle-bow; the currents thereby induced in the coil are powerful enough to set the fork of the receiving station in such intense vibration that the sound may be distinctly heard in a large room; warned by this signal a person can in the usual way put the telephone to his ear and listen to the words from the transmitting station; and so *vice versa*.

I have made an experiment in a large room, when about 100 people were present, and all could hear the sounds of the fork, which in the manner described was set in vibration by a second fork in a distant room. The two forks were König Ut_4; lower forks give less clearly heard tones; with higher forks I was unable to make any experiment, since I had not two similar ones at my disposal.

Let me mention two other experiments which I have made. The first is of importance in connection with the question as to how the clang-tints of tones are reproduced through the telephone. In one of the two telephones described substi-



THE TELEPHONIC ALARM.

tute for the Ut_4 fork a higher one, and sound this by means of a fiddle-bow, and there will be heard with another inserted telephone of the ordinary construction tones of even 12,000 double vibrations per second, a sign that the variations of the magnetic condition of a magnet perceptibly occur, even when the forces producing these variations change their size 24,000 times in a second. This result, moreover, was not to be expected, since, as is known, magnetic polarization requires time to accomplish. Whether these higher tones are comparatively weaker than the deeper cannot be determined, but probably this is the case.

In another experiment I used the telephone to test the electric vibrations indicated by Helmholtz and others, which are produced by the opening of the primary current of an induction apparatus in the induced coil, when the ends of the latter are connected with the armatures of a condenser. For this purpose I inserted the telephone in the circuit between coil and condenser, and observed the effect when the current in the inducing spiral was opened.

When the ends of the induced spiral were not connected with the condenser, I heard a dull report in the telephone; when again these ends were connected with the condenser, this report was accompanied by a shorter, higher sound, whose vibration-number might perhaps be determined by a musical ear; a proof of the existence of the vibrations mentioned in the last case. The observations were made with a telephone the iron membrane of which was very thin and had a very deep tone.—W. D. RÖNTGEN, *in Nature.*

A FOWL MONSTROSITY.

BY JOHN MICHELS.

An interesting instance of a strange malformation in the head of a fowl has been exhibited alive at the New York

A FOWL MONSTROSITY.

Aquarium, and as Professor Fr. Stengel of Columbia College vouches for its authenticity, it may be presumed to be a genuine specimen.

The illustration will convey an excellent conception of the peculiarities of the fowl in question, which is said to have a monkey's face. It will be noticed that the ordinary beak of a bird is absent, and that the nose and lips of an animal are fully developed.

The nose appears to be formed by an extension of the comb, which at the point of junction suddenly changes from a bright red to a pale fleshlike color; the lips, which are large and protruding, having the same hue.

Both lips and nose are formed of a moderately hard cartilagenous substance, having a smooth surface, the nostrils being very similar to those observed in many species of monkeys.

The tongue is also modified in form, rounded at the point, and having unusual power of lateral motion.

With the exceptions I have named, or shown in the illustration, the general appearance of the specimen is normal, and indicative of its being of the Cochin China breed.

We have doubtless here an interesting specimen of one of those strongly marked and abrupt deviations of structure which occasionally occur without any apparent cause.

Such cases are rare with birds in a state of nature, but happen with greater frequency with those which have become domesticated.

This monstrosity probably arose from an arrest of development rather than arrest of growth, and is doubtless capable of being transmitted. Breeders take advantage of such freaks of nature to produce what is called a variety.

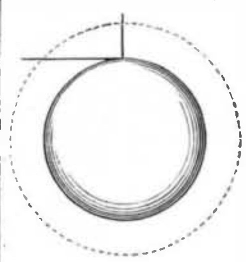
Speaking generally, it is conceded that changed conditions and external influences produce variation from type, and considerable effect upon organisms of all kinds.

There are, however, instances in which decided variation arises without any apparent exciting cause, and Darwin with his usual caution "provisionally" calls it "spontaneous;" he attributes such variations, whether consisting of slight individual differences or of more strongly-marked deviations of structure, as depending much more on the constitution of the organism than on the nature of the conditions to which it has been subjected.

The Apparent Size of the Moon.

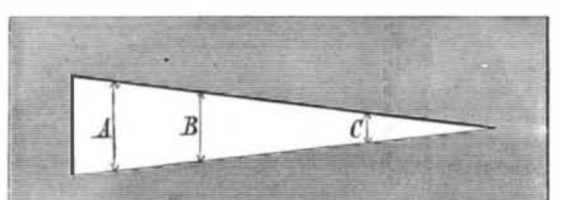
To the Editor of the Scientific American:

You have frequently noticed that the moon looks very much larger when it rises and sets, than when it is nearly overhead, on the same night, the objects on its surface appearing magnified. I have accounted for the variation in its apparent size on the principle of the refraction of light, more rays being bent and brought to the eye while they pass through the dense medium, when the moon rises and sets, than when the rays pass through a rare medium, as when the moon is nearly overhead.



The rays, when the moon is near the horizon, pass through more air than when directly overhead.

I have heard it said, and think I read it in the SCIENTIFIC AMERICAN, that the moon only looked larger by comparison with objects near the horizon. It did not occur to me how to test the matter until a short time since I made a triangular hole through a piece of card board and placed it 21 inches from my eye and looked through it at the moon. When it was rising near the horizon it would fill the space marked *A*, sometimes *B*, and (when overhead) *C*.



Does not this prove that the moon does really look larger by being magnified through the medium of the air?

Please mention this in your paper with remarks, which may enlighten others. Yours, etc, OBS.

LACONIA, N. H., Dec. 25, 1877.

A. This apparent difference in the size of the moon, according to its position in the heavens, is (as has been frequently explained before) merely an optical illusion.

When we regard the celestial vault, it has the appearance to us of a very much depressed spheroid, instead of a hemisphere, and, for this fact, the zenith looks much nearer. In looking at objects along a horizontal plane, we are accustomed to estimate their relative sizes and distances by comparison. Now, in viewing objects situated above, as we lack the same means of comparison, and hence are apt to greatly under-estimate their distance, the rising moon may appear much larger than a tree placed beside it on the verge of the horizon; but, when she reaches the zenith, the tree (which at the horizon served to give us an idea of greater distance) being absent, we with our under-estimate of vertical distance unconsciously make an exaggerated allowance for it, and, doing this, we likewise underestimate the apparent size of the moon and see it smaller.

COL. W. H. REYNOLDS has concluded a contract with the English Government by which the Post Office Department has adopted the Bell telephone as a part of its telegraphic system. In a recent telephonic experiment in connection with the cable, 21½ miles long, between Dover and Calais, there was not the slightest failure during a period of two hours.