

and much bowed outwards like the legs of a baby. The thumb of the foot has great powers of prehension; indeed, it may be said that the thumb proper is carried on the foot.

It is to be carefully marked that the gorilla has no calf to the leg and no biceps in the forearm. According to my observation, he cannot stand upright without supporting himself by means of some object. I have frequently seen human beings acting the part as monkeys. It will be remarked that in this case the moment the man is able to relax his performance he stands instantly upright; the gorilla, on the contrary, instantly he possibly can do so, drops on all fours on the ground.

As the gorilla walks, it will be seen that his back is almost square. I have ascertained that this great breadth of back is given by the ribs, which are broad and very strong. In the human subject the space of about a hand's breadth intervenes between the bottom of the ribs and the top of the pelvis or hip bones. In the gorilla the ribs come close down on to the top of the hip bone. The hip bones themselves are not spread out laterally to support the weight of the body as in man, but are narrowed as in many running animals. The gorilla has apparently no more voice than a roughish guttural sound. We have not, however, yet seen him in a rage. Under these conditions it is just possible he may make a great noise. I have put my finger into his mouth, and have ascertained that he has no pouch, nor anything like a pouch. He puts everything he can get hold of into his mouth, and on all occasions his mouth and teeth are used as weapons of offence and defence. In this one fact alone there is a vast difference between human beings and gorillas. When men quarrel they always use their hands, and in very exceptional instances their teeth.

The gorilla, as far as I have ascertained, does not use a stick for the purpose of striking, nor does he as yet ever strike with his hands; it is, however, most remarkable that he frequently claps with his hands; in doing this, his right hand is always uppermost. I do not think this is the result of imitation, or that he has been taught; it is, I think, a natural action. I gave him my hat, he placed it before him upon the floor and began immediately to drum upon it.

I am afraid the disciples of Darwin will be greatly discomfited by the advent of this gorilla. If the reader will kindly put his or her hand to the ear, he or she will find a very slight hard little knob on the external edge of the fold of the ear, about a quarter of an inch from its highest part. The presence of this knob, according to Darwin, indicates "the descent" of you and me, my friends, "from a hairy quadruped, furnished with a tail and pointed ears, probably arboreal in its habits, and an inhabitant of the Old World.

I was especially careful to examine the gorilla's ear, and I discovered that he *does not wear a knob on his ear.*

Pongo is but three and a half years old, and therefore quite a baby. I was most interested to see how his infantile instinct is more in accord with the human infantile rather than with the adult mind. He is respectful, grave, and somewhat distant towards adult ladies and gentlemen. A little boy and girl luckily came in to see him while I was present. After a while they both began to play in a child-like fashion with Pongo. Gradually they fraternized, and began to play together after the manner of little children. Not being a child, I cannot enter into their funny sayings and doings about nothing at all. So these three, the little fair-haired boy and girl and the gorilla, played together after their own childish fashion for nearly half an hour. Pango evidently liked the little girl best, and I made her experiment on him with ornaments, handkerchiefs, etc.; but no—the ape's brain could not understand the human. Pongo put everything in his mouth, and tried to bite it up.

One little point—the human lips are made for speaking, not so the gorilla's. They are the lips of a beast. Moreover humans have hair on their heads. Pongo's hair is simply a kind of fur continuous with the other covering of the body.

I now come to a point to which I think attention has not been sufficiently called in the examination of the comparative anatomy of the man and the monkey. I mean the presence in the actual brain of that curious body which feels to the fingers like a grit of sand. This is called in anthropology (*s. e.*, human anatomy) the "pineal body." I have often examined this pineal body and wondered what the meaning of its presence in the human brain could possibly be. This pineal body is thus described by a high authority

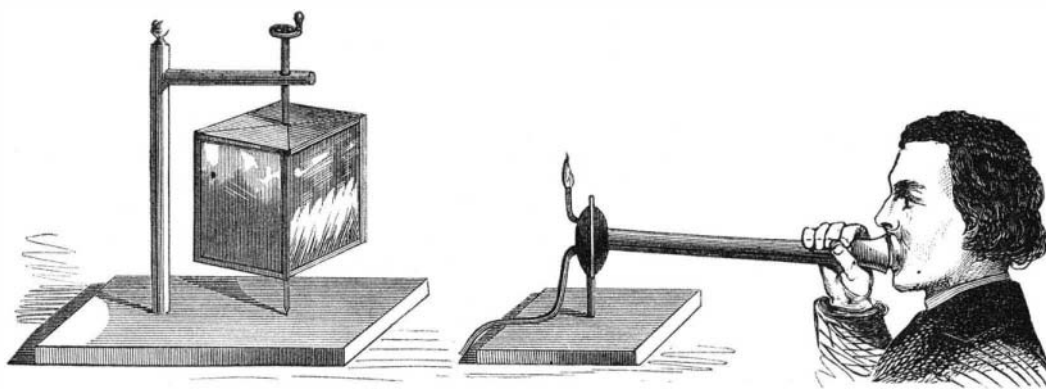
in anatomy: "The pineal body consists principally of large uncleated vesicles, and contains some tubular fibers. In a cavity which is formed towards its base is contained a mass of sabulous (sand-like) matter, which is composed of phosphate and carbonate of lime. To this Semmering gave the name *Aceroulus*. It is found only in subjects after seven years of age, and is in a great degree peculiar to the human subject.

"The subject of the pineal body is very imperfectly known, and although its office has been a theme for some of the wildest speculators in physiological theories, we are still utterly in the dark respecting it."

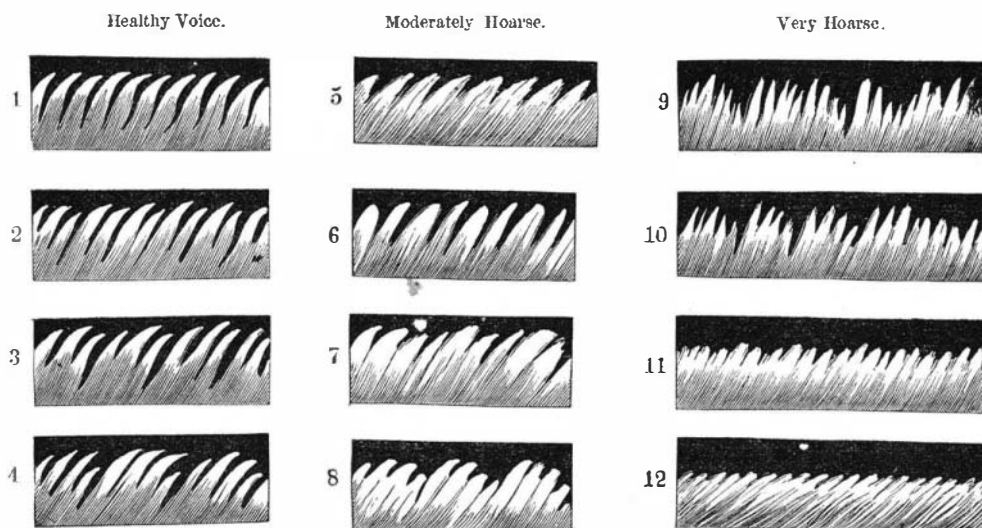
Now, has the gorilla a pineal body in his brain, or has he not? I confess I am exceedingly curious, and doubtless the readers of these lines are also curious, to know whether the gorilla has or has not a pineal body in his brain.

Chinese Suspension Bridges.

The most remarkable evidence of the mechanical science and skill of the Chinese is to be found in their suspended bridges, the invention of which is assigned to the Han dynasty, which flourished 1,600 years ago. According to the concurrent testimony of all their historical and geographical writers, Shang-leang, the commander-in-chief of the army under Kaou-tsoo, the first of the Hans, according to Thornton's "History of China," undertook and completed the formation of roads through the mountainous province of Shen-se, to the west of the capital. Hitherto its



APPARATUS TO REPRESENT GRAPHICALLY THE CONDITION OF THE HUMAN VOCAL ORGAN.



FLAME PICTURES OF HEALTHY AND DISEASED VOICES.

lofty hills and deep valleys had rendered communication difficult and circuitous. With a body of 100,000 laborers he cut passages over the mountains, throwing the removed soil into the valleys, and where this was not sufficient to raise the road to the required height, he constructed bridges, which rested on pillars or abutments. In other places he conceived and accomplished the daring project of suspending a bridge from one mountain to another across a deep chasm. These bridges, which are called by the Chinese writers, very appropriately, "flying bridges," and represented to be numerous at the present day, are sometimes so high that they cannot be traversed without alarm. One still existing in Shen-se stretches 400 feet from mountain to mountain, over a chasm of 500 feet. Most of these flying bridges are so wide that four horsemen can ride on them abreast, and balustrades are placed on each side to protect travelers. It is by no means improbable (as M. Pauthier suggests) that, as the missionaries in China made known the fact more than a century and a half ago, that the Chinese had suspension bridges and that many of them were of iron, the hint may have been taken from thence for similar constructions by European engineers.

American Institute Exhibition.

Persons intending to exhibit this fall should at once forward their applications for space to the General Superintendent, otherwise they will not be able to secure the room they may desire. The managers are exceedingly anxious to have the exhibition in good shape upon opening day (September 12), and will do so if the exhibitors will only be as prompt as they should be in placing their exhibits in order.

THE STUDY OF THE DISEASES OF THE HUMAN VOICE.

The graphical method of investigation, which has rendered such important services in the study of purely physical phenomena, has of late years been called upon to perform kindred offices for the sciences of physiology and medicine, in order to represent definitely and directly the normal as well as the morbid or abnormal functions of the human body.

Though as yet but little cultivated, it has already given results which have led to discoveries of great practical as well as theoretical interest and importance.

The examination of the character of the pulse in various diseased conditions of the body, more especially of the heart, by means of the apparatus known as the *sphygmograph*, is a notable case in point. From the charts produced in this method one skilled in the art is able to read at a glance not only the nature of the disease, but also the stage at which it has arrived, and the degree of danger existing.

These happy results gave the impulse to similar experimentation regarding the influence of throat diseases upon the quality of the voice.

The apparatus used in this investigation is shown in the annexed engraving. It is ordinarily known as Koenig's flame manometer, though for the present purpose it has been so modified as to be capable of responding to the slightest variations in sounds. It is composed of a large cube whose four vertical sides are covered with mirrors, and which is revolvable about a vertical axis; of a gas jet, burning with a small flame; and of a mouthpiece which terminates in a lenticular box or capsule. A very thin, tense, and impermeable rubber membrane divides this capsule into two compartments, in one of which the sounding tube terminates, while the other serves as a passage way for the gas from the conducting tube to the jet at which it is burned.

On singing or speaking into the mouthpiece, sound waves are produced by the alternate condensation and rarefaction of the air within the tube; the rubber membrane acquires a corresponding rate of vibration, and so modifies continuously the rapidity of the delivery of the gas to the burner, causing the gas flame to leap up and down in unison with the sounds transmitted. On rotating the prismatic mirror this but slightly perceptible motion is rendered distinctly obvious, persistence of vision spreading out the image of the flame into a broad serrated band of light. These serrations vary with the character of the tones produced, as well as the degree of the diseased condition of the vocal chords. In the latter case especially the difference in appearance of the image becomes so striking that a skilled observer can very readily form a correct idea as to the actual state of the vocal organs. The flame pictures shown in the accompanying engraving will enable one to form but a very feeble idea of the great variety and richness of the forms, and the many curious light effects, which are here caused to make their appearance.

The first series of flame pictures shown in our engraving was produced by a normal human voice, the upper variety being the effect of a high note, while the lower three, containing respectively sets of two, three, and four teeth, were produced by successive lower notes. With a proper delicate adjustment of the instrument the differences between a fine, cultivated voice and a defective one were rendered strikingly manifest in a clear, regular, well-defined cut of the teeth of light in the case of the former, every fluctuation in the intensity of the notes being made distinctly visible. The second series represents a moderate degree of hoarseness; the serrations are but imperfectly formed, and are no longer so regular or so constant in appearance. The tongues of the light are not so clearly cut and are shorter, since the range of vibration of the vocal chords is much smaller. The third series refers to a severe degree of hoarseness, especially that attending the formation of tubercles in the lungs, syphilis, and various kinds of chronic inflammation. A thickening and partial destruction of the vocal chords here present great obstacles to their vibration, so that in 9 and 10 the serrations have gotten to be very irregular. The two last flame pictures represent an almost complete immovability of the vocal chords, the glottis remaining constantly open, and the passing air capable of setting the chords in but very slight vibration. This method of investigation has not yet reached the limit of its applicability, and further important and interesting results are continually being reached.

To produce a rosewood finish, stain the wood with dilute nitric acid, and grain with burnt umber, and glaze with carmine or lake.