OUR SIMIAN VISITORS.

The New York Aquarium now possesses the most extensive collection of anthropoid apes ever brought to this country, and one which, as a subject of study, is of the highest interest to all naturalists. The animals number five chimpanzees and one orang-outang. One of the former is the survivor of the pair imported some months ago; the others were brought over together, and have been on exhibition for some weeks. All are apparently strong and healthy, and as the atmosphere in this city is dry and unlike the vapor laden air of England and Northern Europe, which has proved so destructive to the exceedingly delicate and sensitive lungs of these creatures, it may be reasonably hoped that they can be maintained for a sufficient period to admit of a thorough investigation of their natural growth and development being made.

The oldest chimpanzee is about half grown, and his age is probably seven or eight years. In common with the others, he is covered with long straight black hair, thick on the head and back, but sparse over the front of the body. On the arms the arrangement of the hair is precisely the same as in man, that is, the hair from the shoulder to the elbow points downwards, while that between hand and elbow points upwards. The meeting is at the elbow, where there is a pendent tuft. Why the hair is thus placed on man and on the larger apes it is difficult to conjecture. Dr. Wood suggests that "if the long hairs were to hang along the arm and wrist, they would get into the hand and interfere with the grasp, while by their reverted growth such an embarrassment is removed." The nostrils are mere holes in the face, any semblance of a nose being absent; and the muzzle projects, giving the face a peculiarly brutish expression. Generally the chimpanzee is of affectionate and amiable disposition, especially when it has been reared in captivity; and it has been supposed that this mildness may be characteristic of the species. The old specimen at the Aquarium, however, apparently negatives this, as he is exceedingly savage. On the keeper entering his cage he pounds the floor with his powerful arms and legs, and if the man is unwary, the animal strikes at him and attempts to seize him by the throat. When irritated or whipped, it cowers into the corner of its den and protrudes its lips, making a kind of short grunting howl, and then suddenly leaps at the aggressor, pounding the floor with astonishing rapidity. When quiet the creature lies lazily on its back, apparently taking no interest in its surroundings. When food is offered, it starts up and performs a kind of dance on all fours, and finally snatches at the object. This dance it sometimes repeats, although for no visible reason, accompanying itself with a kind of quick howl.

The four smaller chimpanzees, ranging from four to two years of age, each exhibit their human-like peculiarities in much greater degree than the older animal. If placed erect, the largest measures about 2½ feet, though the stature seems to be smaller owing to the thick-set build. They are playful, and manifest their emotions in unmistakable manner. Dr. Dorner, the zoölogist of the Aquarium, states that when three of them were liberated from the boxes in which they were transported, and placed together in a large cage, their signs of delight at meeting were most remarkable. They rushed together and embraced each other, and then, as if actuated by a common impulse, began a minute inspection of their new quarters. This done, they met on the floor, and seemingly communicated impressions. Suddenly the two males set up an animated howl, the motive apparently being disapproval of their companion, a female; and then both gave way to the most excited grief, which was only relieved when the keeper took them in his arms and quieted them, as if they were babies. It required patient and systematic treatment, our informant states, as is sometimes necessary with obstinate children, to get a final understanding in the group. The youngest of the five, which, as already remarked, was one of the original pair imported, is especially affectionate and wonderfully childlike. The refusal of the keeper to take her in his arms elicits a crying fit, followed by a paroxysm, in which the animal wreathes its arms over its head and screams with rage, the whole performance reminding one of the behavior of an over-indulged child when crossed. Another peculiarity of the chimpanzee is the care it exercises in eating. Nothing is put in its mouth that is not critically examined with the utmost deliberation, and with an owl-like expression of wisdom. There is never any of that sudden seizure and instant cramming of food into the cheeks, after the fashion of the lower orders of monkeys.

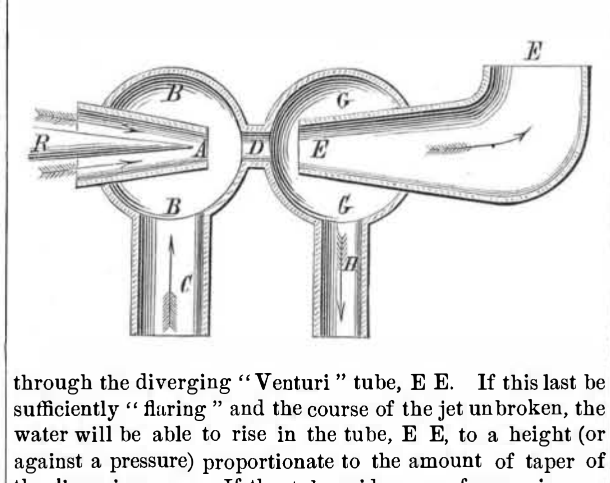
The orang-outang is probably the most valuable specimen in the collection, owing to the scarcity of its species even in its native country, Borneo, and its extreme susceptibility to atmospheric changes. It is one of the most hideously repulsive brutes that can be imagined. It is a nearly full grown male, some four feet in height, and showing on its face the remarkable callosities which are indicative of adult years. The paunch is large and protuberant, the head exhibits the heavy bony ridges peculiar to the species, and the body is quite thickly covered with long red hair. The differences between the orang-outang and the chimpanzees are clearly marked. The orang has a short round skull, the chimpanzee a long one. The arms of the former extend when the animal is erect to about the ankle joint, those of the chimpanzee to nearly half way up the calf (the gorilla's finger tips, it may be added, extend a little below the knee). The orang, when on all fours, rests its hands on the backs of the fingers between the large knuckles and first joint; the chimpanzee, between the first and second joints. The chimpanzee uses its hind members more as legs than as arms. For example, in climbing a rope it will go up hand over hand and foot over foot regularly, grasping its first hold with a hand. The orang, on the contrary, uses all four members indifferently for like purposes. It may grasp at first with a foot and pull itself up, seizing hold with a hand afterwards, its entire motion showing it to be more at home moving among tree branches than under any other circumstances. The anatomy of its rear members, different from that of those of the chimpanzee, shows clearly the distinction. The orang's hind limbs, besides being comparatively short, are loosely jointed at the hip bones, and the strong ligament (the *ligamentum teres*), which in man, the gorilla, and the chimpanzee binds the thigh bone to the hip joint, is absent. The result is that their tread is very unsteady, and the legs can be bent or twisted rearward in curiously complicated contortions. The orang at the Aquarium is quiet and harmless. It moves about but little, preferring to keep rolled up in its blankets, which it adjusts with ludicrous care and gravity. The general appearance of the animal conveys the impression that it is lost in deep meditation, and as this look is maintained while it carefully piles its food pans together and sits in them, its proceedings are laughably absurd.

It is hardly safe to accept the conclusion that the chimpanzee is of a higher degree than the orang-outang, or the reverse, in the absence of more positive knowledge. Each species has strongly marked characteristics which indicate a higher development as compared with the other, notably the small delicate ears of the orang in contrast with the large ones of the chimpanzee, and the legs of the latter in comparison with the rear arms of the former. Carl Vogt has suggested that the gorilla is a developed baboon, the chimpanzee a developed macaque, and the orang-outang a developed gibbon. Similarly continuing the chain of evolution, the idea has been broached that different races of men had varied Simian ancestries, the Malay, for example, being derived from the orang-outang, and the negro from the chimpanzee tribe, the ground being the similarity of prominent skull characteristics.

THE INJECTOR.

Taking steam from a boiler at a given pressure and causing it to drive water into that boiler at the same or a higher pressure would seem at first sight paradoxical. But we must remember that we do this very same thing with the ordinary steam "donkey" pump, and the mystery lessens, the wonder becoming that it can be effected without any differential areas of pistons, etc., and by a simple arrangement of tapered tubes. We propose to show that it is not at all like "lifting one's self up by the bootstraps," but is just as philosophical and unmysterious as any other operation and result in steam engineering. There is no "perpetual motion" about it.

Suppose we have a conical tube, A, discharging steam through a chamber, B, with contracted orifice, D, and a diverging tube, E; all three placed exactly in line. If the chamber, B, is closed the air in it is rarefied and causes water to flow up through the tube, C, if proper connections be made. This water condenses the steam, and the two fluids pass out



through the diverging "Venturi" tube, E E. If this last be sufficiently "flaring" and the course of the jet unbroken, the water will be able to rise in the tube, E E, to a height (or against a pressure) proportionate to the amount of taper of the diverging cone. If the tube widen, say, from a in section to b, this pressure of the water column will be equal to $\frac{V^2}{2g}$ times the difference between the atmospheric pressure and the square of the smaller section divided by the square of the greater. It is common to make this ratio of diameter $\frac{a}{b} = 0{\cdot}16$; then $\frac{a^2}{b^2} = 0{\cdot}0256$, and as $1 - 0{\cdot}0256 = 0{\cdot}9744$, we have the height in feet corresponding to the water pressure $H = \frac{V^2}{2g} \times 0{\cdot}9744$.

But we may wish to make the taper ratio $\frac{a}{b}$ greater, so as to make H greater; and we may assume $\frac{V^2}{2g}$ = this height.

The mixed jet must be kept at such a low temperature as not to be vaporized in the second chamber, G; that is, less than 212° Fah. (= 100° C.). Otherwise, steam will escape from the pipe, H, if there be such a discharge.

To improve the machine we can either increase the useful section of the orifice, D, by moving the pipe, A, further back, or keep this nozzle there and lessen its steam discharge by inserting a conical rod, R.

What we want is to get all the steam condensed by water in the first chamber (A), and to keep the temperature of the mixture lower than that of corresponding saturation at the mean pressure that there is in the second chamber (G).

(If G communicate with the air, this temperature of saturation is 212° Fah.)

If the feed supply be lower than the steam jet (as in the diagram), there will be in B a mean pressure correspondingly lower than that of the atmosphere. If the feed supply be higher, there will be a corresponding increased pressure.

If the chamber, G, communicates with the air, the temperature of the liquid jet entering it will be lower than 212° Fah.

We can obtain at will either quantity or velocity (that is, pressure) of conveyed water.

Raising the temperature of the supply water increases the quantity of conveyed water, and lessens the velocity of the mixed streams.

Lowering the temperature of the mixture rapidly increases the proportion of conveyed water. At 212° Fah. the water has maximum velocity and is in minimum quantity.

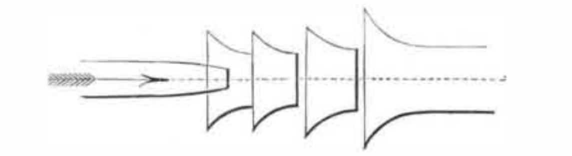
With dry steam the proportion of conveyed water increases over that obtained with "wet" steam.

The injector is a much more economical boiler feeder than pumps are; but, considered simply as a water raiser, its duty is comparatively low (about ⅙ that of the pump), most of the heat of the steam being employed in raising the temperature of the feed.

To get the best mechanical performance out of an injector we wish to place it as high up as possible. This diminishes the pressure in the chamber, G (if closed), and lowers the temperature of the steam jet—that is, the temperature of saturation due to the reservoir pressure in G. The work of getting the water into G will then be just as in a suction pump, and practicable up to about 25 or 26 feet lift. This will give the greatest possible fall of steam temperature between the boiler and the injector orifice, and thus secure the highest mechanical effect attainable here; and an injector working thus will differ from one doing ordinary feeding, with steam about 212°, just as a condensing engine differs from a non-condensing.

The water raising performance of the injector increases rapidly with great heights, and on account of its great convenience the machine is hence good for draining mines, etc. It should be remembered that it is best for this purpose to give it all the height of draught it will stand.

A water jet may be substituted for a steam jet, and we may consider water jet injectors at some other time.



Using several successive funnels has the useful effect of permitting the water raised to arrive at the injector with considerable velocity.

The jets may be used as a condenser, and then become an ejector.

An injector may be used to advantage in working a hydraulic press, where a pump of sufficient power is lacking.

The very causes of weakness of the steam injector as a draining pump (the disproportion existing between the possible and the actual lifting height of a liquid, and also the disproportion between the specific gravities of the steam and the liquid raised by it) make it a more satisfactory device for a gas pump.

The exhaust nozzle of a locomotive is an instance of an injector used as a gas pump; the employment of an intermittent jet being found an advantage for the purpose named. The injector is also used as a blower and ventilator, in which case it is really a gas pump.

One of the most important steps in the progress of the injector is its special adaptation to locomotive feeding, etc., by employing two devices—one a lifter, calculated for the difficult suction and the varying steam pressures; the other, a forcer, taking the water from the lifter and putting it at any desired temperature or pressure into the boiler.

The beauty of this combination is that by using only part of the steam in the lifter the increase of temperature of the water is very slight; the supply may, therefore, be quite hot without bringing the temperature in the condensing space up to 194° Fah. (about the maximum).

Also the forcer is fed under invariable pressure by the lifter, and is not dependent upon variable degrees of vacuum. No Watt's regulation is thus necessary.

IF any one doubts the onward march of improvement let him remember that the old plan of fastening your napkin around your neck at dinner time has been done away with by the patented invention of Marshall Burnett, of Hyde Park, Mass. You clamp a sort of a wire fence to the edge of the table before your dinner plate. The fence is jointed like lazy tongs. You place your napkin on the fence and pull the latter up under your chin when you are taking soup; push down the fence and napkin when you are done.

HEAT, LIGHT, AND TIME.—A recent patent for a nursery lamp shows a plan for warming liquids, giving illumination, and showing the time; which latter is done by the fall of the oil in a tube, the flame being gauged to consume a given quantity of oil per minute.