Correspondence.

There are Cats in Leadville, but no Chinamen.

To the Editor of the Scientific American:

In your issue of Nov. 4, I notice the statement made by your exchange that there are no cats in Leadville. This statement, which has pretty well gone the rounds of the papers, I know from personal knowledge to be untrue, for there are cats here, as well as rats and mice. It is true this is not a healthy place for cats, for more than half of those which are either brought or born here die of fits. One thing is certain: they do not die of any lung trouble, for although we are some 10,000 feet nearer heaven than our average fellow man, we hear something else at night than angel voices.

There is one thing that does not live here, and that is a Chinaman; not that his health would not stand the altitude, for he has had no chance to try it more than a hour or two at a time, but the last one that came to try the climate went out curiously examining the end of his queue, which had previously been attached to his head. H. W. H.

Leadville, Colorado, Nov. 7, 1884.

A Wonderful Ancient Aqueduct.

Dr. Ernest Fabricius, a member of the German school at Athens, has given an account of the ancient aqueduct at Samos, described by Herodotus (book iii., cap. 39–60). The aqueduct was constructed during the sixth century B. C., after designs by Eupalinos, a Megarean architect. Dr. Fabricius' account is as follows:

The aqueduct falls naturally into four divisions: 1. The spring itself, with the building over and about it. 2. The portion of the aqueduct leading from the spring to the intervening hill. 3. The tunnel proper through the hill. 4. The aqueduct from the hill to the town.

Fortunately, about the spring itself there had never been any difficulty. There is only one spring of any considerable size that did correspond to the "Great Spring" of Herodotus. This spring is marked by three chapels to St. John, known among the natives of the island as the "Hagiades." There is no doubt, therefore, whence the aqueduct started. It is between this spring and the port of Samos, the modern Tigani, that the mountain ridge intervenes. Never was a town worse situated with respect to its water supply. Either the mountain must be tunneled or the water led round the base by a long, awkward circuit. Portions of the well house structure still remain, and are, in fact, still used by the natives. It consisted of a building in the shape of a right angled triangle, with a slightly rounded hypothenuse, the roof supported by fifteen pillars.

Second comes the portion of the aqueduct between the well and the tunnel proper. Here the conduit was about the height of a man, partly hewn out of the solid rock, partly built up out of masonry. It is about 853 meters in length. Lying about in this part have been found large quantities of cylindrical tiles, no doubt either the brick pipes mentioned by Herodotus, or at least their modern successors. Third, we come to the tunnel proper. The merit of having discovered the actual mouth of the tunnel belongs to the present abbot of the neighboring monastery of the Hagia Trias. For five months he and a fellow abbot of the monastery of Stauros superintended the labor of fifty workmen, and laid bare the entrance and a part of the tunnel itself. It would be much to the advantage of the inhabitants of the modern Tigani if the work could be completed, and they could be supplied with good drinking water after the same fashion as their ancestors of the time of Polycrates. Unfortunately, the investigation of the actual tunnel is still in part, owing to the insufficiency of the props, a matter of considerable danger. On the south side it is accessible for 500 meters, on the north for 100 meters. Except at the entrance and the exit, where it is supported by masonry, the tunnel is bored through the solid rock.

Abundant marks of hammer and chisel still remain, the work never having been finely finished. Along the walls niches are frequently found, and in some the very lamps remain which served to light the workmen. A little to the south of midway an interesting fact comes out. About 425 meters from the mouth, in a southerly direction, the tunnel ends in blank rock. It is clear that the boring was begun from the two sides of the mountain. A slight error was made, and hence one of the bores comes to this blank end. The error was rectified by digging down till the lower bore was struck, and, just as we should expect, we find that at the meeting point the tunnel is, instead of being just large enough for a man to stand upright, as high as 4 to 5 meters. At either end of the tunnel proper the walls are, as we said before, supported by masonry. On the north side much more masonry is needed for support than on the south. There is evidence that at first the supports were of wood, ultimately replaced by solid stone.

It is this third portion of the conduit, *i. e.*, the tunnel proper, that alone aroused the admiration of Herodotus. We remember he says that with the tunnel there is a second tunnel or dike 20 cubits deep. Such is in reality the case. The water does not flow through the tunnel, but in a deep ditch dug beneath it. It is at the bottom of this ditch that the brick pipes are laid. Unhappily, Herodotus gives us no clew to the reason of this curious and complicated arrangement. Dr. E. Fabricius conjectures that this second arrangement was made after the first tunneling, and in order to correct some error in the necessary level of the water supply. The tunnel seems to have been in use in Roman times; small chambers hewn in the rock seem to be Roman work. They supplemented the aqueduct, however, by a second supply of water brought round the mountain. We have also traces of early Christian influence. About 20 inches from the central meeting point of the two bores we come upon a small rock-hewn chamber, in which are a number of white marble pillars and some marble slabs, all much incrusted with stalactites. On one of these, when cleaned, were found unmistakable traces of a Byzantine style of ornament. No doubt the little chamber was used as a shrine. Last, we come to the fourth section of the aqueduct, the portion that leads from the tunnel exit to the town. The end of the main conduit has never been found; probably it came out near the shore, where good drinking water would be especially needed. Close to the harbor lay the ancient Agora, and according to an inscription found built into the walls of the modern Tigani, there was in this Agora a stoa which contained two elaborate klepsydræ, or water clocks, which told the water drawer's month, day, and hour. As there is no spring in the neighborhood of Tigani which runs the whole year round, we may reasonably suppose that these marvelous klepsydræ were worked by the water that came through the tunnel of Eupalinos. Possibly the tyrant Polycrates had a taste for the marvelous in the water clocks as well as rings.—*The Sanitary News.*

[FOR THE SCIENTIFIC AMERICAN.]

TELESCOPIC VIEWS OF VENUS AND JUPITER.

At the close of my night's work in comet seeking, I have of late given special study to the markings on Venus and

Fig. 1.—VENUS.

Jupiter. Venus is best observed in twilight with any telescope, but with the reflector a very superior view of this difficult object is obtained, owing largely to the absence of chromatic aberration in that instrument.

My observations have been made with the nine inch reflecting telescope, and often continued into broad daylight, or until within a few minutes of sunrise. It must be understood that these are all morning observations.

Fig. 1 is a telescopic view of Venus, showing some faint, delicate markings upon its half-illuminated face. All these markings are difficult to see by an observer who has not trained his eyes for the detection of faint objects, except the central marking, which I consider comparatively easy with telescopes of moderate aperture.

I have so seen it with the aperture reduced to five inches.

Fig. 2 is a telescopic view of Jupiter, showing the appear-

Fig. 2.—JUPITER.

ance of its interesting belts during the past three weeks. The north and south equatorial belts were of a bright copperish hue, the southern being twice as broad and much more intense in color than the northern one. The intermediate space, directly on the equator of the planet, was of a general dull purple color, quite faint, and mottled with large white spots, as I have indicated in the drawing.

The views are inverted, as seen in the telescope. In the upper right hand corner of Fig. 2 may be seen two of the four moons of Jupiter. WILLIAM R. BROOKS.

Red House Observatory, Phelps, N. Y.,
November 3, 1884.

A MEETING of some fifty prominent business men of Pittsburg met the other day, and decided to organize a stock corporation, having a capital of $250,000, with the privilege of increasing it to half a million dollars, for the purpose of erecting and maintaining an exposition building in that city.

The London "Inventions" Exhibition.

It will be noticed by reference to our advertising columns that the time during which American inventors may apply for space in this exhibition has been extended from October 1 to the 31st of December. As its title indicates, it will be, we are assured, a most unique display, in no way like the many other exhibitions which have been and are constantly being held; for exhibits are to be strictly confined to illustrations of apparatus, appliances, products, and processes invented or brought into use since 1862. It will not, therefore, be a great bazar, with a bewildering variety of old and new things thus advertising themselves, but will rather afford high educational opportunities for thoughtful men and inventors, and be altogether more profitable in this way from its exclusion of all but that which shows the most recent progress. It is not to be wondered at, therefore, that the managers of this exhibition—which is held under government auspices—especially desire a full representation from the United States, for have not our inventors been conspicuously in the van of the world's progress during the past generation? But then our inventors can well afford in this way to bring the fruits of their genius before the best judges of England, and thus, in fact, of the world.

All necessary information as to space, etc., with printed forms, will be supplied by the Hon. Pierrepont Edwards, the British Consul in New York city.

The English patent law is now very liberal, but it is strict in requiring that applications for a patent shall be made before the invention is publicly made known there; and even before the description of the invention is put in printed form in this country, application should be made. Intending exhibitors who have not yet taken this precaution have no time to lose.

Human Vision.

Persons speak of their eyes being fatigued, meaning thereby that the seeing portion of the brain is fatigued, but in that, says Dr. W. W. Seely, they are mistaken. So men say their brains are tired. Brains seldom become tired. The retina of the eye, which is a part of the brain and an offshoot from it, hardly ever is tired. The fatigue is in the inner and outer muscles attached to the eye and in the muscle of accommodation. The eyeball, resting in a bed of fat, has attached to it six muscles for turning it in any desired direction, and the muscle attached to the side nearest the nose and one at the outer angle of the eye should, in every normal eye, be balanced. They are used in converging the eye on the object to be viewed, and the inner muscles are used the more when the object is the nearer. The muscle of accommodation is one which surrounds the lens of the eye. When it is wanted to gaze at objects near at hand, this muscle relaxes and allows the lens to thicken, increasing its refractive power at the same time that the muscles on the inner or nasal side of the eye contract and direct the eyes to the point gazed at. It is in these muscles that the fatigue is felt, and one finds relief in closing the eyes or in gazing at objects at a distance. The chief source of fatigue is the lack of balance in the two sets of inner and outer muscles of accommodation. It may be set down that there is something wrong when the eye becomes fatigued. The defective eye, as it gives out sooner, is really safer from severe strains. The usual indication of strain is a redness of the rim of the eyelid, betokening a congested state of the inner surface, accompanied with some pain. When it is shown that the eye is not equal to the work required of it, the proper remedy is not rest, for that is fatal to its strength, but the use of glasses of sufficient power to render necessary so much effort in accommodating the eye to vision. It is not good sense to waste time in resting the eye, and that practice does not strengthen it.

Eyes begin to age at about the tenth or twelfth year of life, when they have reached their full development. At the age of forty-five or fifty years the lenses cease to thicken, when the pressure is removed and their presbyopia, or old sight, begins. When a child is compelled to use or require the use of glasses, there is little reason to hope that it will outgrow the need; but the person will use these glasses as a basis, adding other glasses as he reaches the age when old sight begins, or using thicker glasses. Dr. Seely, however, mentioned one case he had observed where a child had outgrown the need of glasses, but in the mean time he had grown from a small and puny child to a large and well developed man.

Second sight, or the apparent recovery of strength of vision, which is sometimes seen in the aged, the lecturer explained as a change, an elongation, in the shape of the eyeball, by which the person became nearsighted, accompanied by a change in the lens caused by the appearance of cataract.

The Wealth from Inventions.

Senator Platt, in his vigorous speech in Congress last winter in support of our patent laws, claimed that two-thirds of the aggregate wealth of the United States is due to patented inventions. That two-thirds of the $43,000,000,000 which represents the aggregate wealth of the United States rests solely upon the inventions, past and present, of this country.

Mulhall, in his "Progress of the World," writes that in effect the invention of machinery has given mankind an accession of power beyond calculation. The United States, for example, make a million sewing machines yearly, which can do as much work as formerly required 12,000,000 women working by hand. A single shoe factory in Massachusetts turns out as many pairs of boots as 30,000 bootmakers in Paris.