would lead one to expect. It is especially difficult to find suitable vessels for it. Thin glass in one piece, like test-tubes and beakers, does very well, but thick glass and all kinds of cement are mostly cracked by cooling; and massive vessels involve the waste of a large volume of the liquid in the process of cooling them down to $-180°$ C. With some trouble, however, Liveing and Dewar have succeeded in measuring the refractive index of liquid oxygen, at its boiling point, for the *D* ray of sodium. They used a hollow prism with glass faces clamped together and made tight at the joints with glycerine. The refractive index so found was 1.2236, somewhat less than that of water in the liquid state, which, near its boiling point, is about 1.32.

The density of oxygen at $-182°$ is 1.124. These figures give for the refraction constant, $\frac{\mu^2 - 1}{(\mu^2 + 2)\, d} = .1265$, and for the corresponding refraction equivalent 2.024. The mean values of the constant and equivalent as found by Mascart and Lorenz for gaseous oxygen are the same as those here given for the liquid.

Ozone is more easily liquefied than ordinary oxygen, but is formed with a storage of energy, and in a concentrated state is very explosive. When oxygen, ozonized in a Siemens' tube cooled with solid carbonic acid and ether, is passed into liquid oxygen, the ozone is dissolved and imparts a deep-blue color to the liquid. The boiling point of oxygen is lower than that of ozone, so that, as the oxygen evaporates, the strength of the solution and the depth of its color increase. The last drop has a steel-blue color, and explodes spontaneously with violence. If a glass tube conveying ozonized oxygen be cooled down to $-180°$ C, or nearly so, the liquid ozone may be seen condensing on the sides and running down. It has been found impossible to collect the liquid, however, for no sooner have two or three small drops run together than they explode, shattering the vessel.

It is certainly remarkable that a substance which, unlike many substances which are formed with a storage of energy, is so unstable at high temperatures, should also be very unstable at low temperatures. Perhaps its instability may be connected with its powerful absorption of light, which is put in evidence by its deep color. What the form may be in which its excessive energy is stored, we can at present only guess at. Can it be that the three atoms, of which its molecule consists, rotate with great velocity about their common centre of mass in exceeding close proximity, and that a small impulse from without increasing the velocity as well as the distance of the atoms suffices to send them off in hyperbolic orbits to scatter destruction amongst the other molecules which they encounter? This might be the case if the velocity of the atoms greatly exceeds the velocity of agitation of the molecules on which the temperature depends.

NEW DISCOVERIES AT BAOUSSÉ ROUSSÉ, NEAR MENTONE.

BY THE MARQUIS DE NADAILLAY.

I KNOW of no discovery touching pre-historic times more remarkable than those made in the caves of Baoussé Roussé, between Mentone and Ventimiglia, on the borders of France and Italy. These caves were first discovered in 1872 by Mr. Rivière. Since that time this learned gentleman has vigorously prosecuted his excavations,[1] and they have yielded numerous human skeletons, all belonging to the celebrated Cro-Magnon race, who at the end of the quaternary period, or perhaps at the beginning of neolithic times, ruled not only the south of France, but also all the Mediterranean shores. It is these same men we meet with under the names of Iberians, Ligurians, Sicanians, perhaps also under those of Pelasgians and Berbers. It is their bones that the brothers Siret found in the south of Spain, Professor Sergi in Italy, and Mr. Rivière at Baoussé Roussé.

All the bones, wherever found, show a great similitude. They are robust, and bespeak an athletic constitution and a large muscular power. The men were remarkably tall, the crania are dolichocephalic, the tibias platycnemic, but since Dr. Manouvrier's observations,[2] we cannot see there an inferior character. The cranium of the first skeleton found (an old man) measured 1,590 cubic centimeters. The cranium of the woman found next to him 1,450 cubic centimeters; but this last measurement is not quite accurate, on account of the decomposed state of the bones.

The man had upon his head a net of small shells (*Nassa neritea*), and bracelets of shells round his arms and legs. Near him Mr. Rivière collected more than 150 stone implements, and also numerous bones of mammals, birds, and fishes, evidently the food of these people.

New discoveries quickly followed the first ones, and we always find a particular mode of inhumation, which, I believe, still exists, or lately existed, in some Indian tribes. The bones of all the adults, after the total decomposition of the flesh, were painted in red with the help of peroxide of manganese or other substances frequently met with in the different caverns.

The last excavations took place in Februaay, 1892, in one of these caves, named Barma Grande. A communication made to the Academie des Inscriptions, March 4, 1892, informed us of the discovery, at 8 metres below the level of the ground, of three new skeletons, a man, a woman, and a young subject whose dentes sapientiæ had not yet evolved. They had been buried on a bed of cinders, broken fragments of charcoal, remains of all sorts, evidently the hearth on which the family cooked their victuals. The boy wore a necklace formed of two rows of the vertebræ of a fish and one row of small shells. At different points hung pendants cut out of the canine teeth of stags, decorated with parallel striæ. The man had also a necklace of fourteen canines of the stag, also striated. With the skeletons were found a certain number of stone instruments, some of them finely worked, but none of them polished, and some bone implements of very gross fabrication.

The man was very tall, and, if we judge by the length of the thigh-bone (545 millimeters), his height must have exceeded two metres[3] (6 feet 6 inches). The boy, who had not yet attained his manhood, measured 1.63 metres (5 feet 8 inches). We must also remark the extreme wear of the teeth, very apparent already in the boy, and which in the man extended to their very root. I have already said that the caves of Baoussé Roussé yielded numerous bones of mammals, but none of them belonged to the extinct species, not even to the reindeer which is found in the south of France even at a late period On the other hand, no polished stone implement was ever found in these caves. We can therefore give these men a pretty accurate date, and place their existence, as I have said, at the end of the quaternary or the beginning of the neolithic times. One cave remains as yet unexcavated. It belongs to the Prince of Monaco. Orders are given that the excavations shall begin next spring. If they produce anything of interest, I will not fail to report them to the readers of *Science*.

Rougemont, Sept. 2.

THE PREVENTION OF CHOLERA ASIATICA.

BY HUGH HAMILTON, M.SC., M.D.

THE symptoms of cholera are so well known that it is a matter of common knowledge; however, to make the subject plain, it is very similar to *Cholera Morbus*, well known to every American, which is due to indigestion and disorder from the eating of improper fruits or too large amounts of perfect raw fruit. In *Cholera Asiatica* there is vomiting, purging, chill, sweat, death in a longer or shorter period. When *Cholera Asiatica* is epidemic, many of these lesser complaints of the digestive apparatus pass under its name, and, as a consequence, many remedies seem to cure the disease, which in fact is probably not *Cholera Asiatica* but *Cholera Morbus*, which is bad enough.

[1] They are related at length in "L'Antiquité de l'homme dans les Alpes maritimes." Paris, I. B. Baillière et fils, 1887.

[2] Dr. Manouvrier has shown that platycnemia is produced by long and hard work continuously acting on the muscles of the leg. It is found to a large extent in hard walkers, in populations living near the mountains. It is more frequent in men than in women; and it very rarely, if ever, exists in children.

[3] The state of the bones precluded any accurate measurement, and comparison, when we reach these extreme heights, is very difficult. The Museum of Paris possesses the skeleton of a giant who measured 2.14 metres, and whose thigh-bone measured 563 millimeters.

But to the science of the subject. The cause of *Cholera Asiatica* is the bacteria, or vegetable fungus, found in the body of those dead from the disease and in the ejections and dejections of those afflicted with it. These bacteria belong under the head of those *peculiarly* fatal to mankind. It assumes the shape of a comma, i.e. (,), or an S-shape. It belongs in the class *Spirillæ*, i.e., S-shaped, but has been described by Professor Koch as *Komma bacillus*.[1] Now this *comma bacillus* is found in the intestines of fresh cholera-corpses and in the dejections of those ill with the plague. This being the source of the disease, although not its origin, we readily see that we must study its habits of propagation; its physical characteristics upon certain *organic* matter; its behavior on *living* material. Then we can scientifically regard its prevention.

It grows quickly upon a surface of gelatinous substances, and renders it after a while fluid. Looked at by a strong glass, capable of magnifying it 100 diameters, it looks like a funnel-shaped ring curled upon itself at the edges, if the gelatine or glue has been stuck with a needle.[2] Upon the smooth surface of gelatine it has a rosy shimmer. It requires a heat of the human body to grow, that is, 98.5° F. (37½° C.), so that it will not propagate at ordinary temperatures of the room. It grows on potato parings and pieces of bloody meat at 30° to 40° C. (86° to 104° F.), at 16° C. (61° F.) it ceases to grow, at 10° C. (50° F.) it exists, i.e., is not killed completely.[3] Just here the nature of heat and cold may be noticed. Cold, agreeably with most vegetable seeds or spores, merely places them in a state of non-germination, particularly if dry; instances are easily brought to one's mind in a crude way by the vitality of the wheat, barley, rice, etc., exposed to excessive cold, while in a congenial temperature and moisture they grow. Heat, however, when applied to the boiling point, destroys all germination; because it is a rapid method of degeneration. Further, this *comma bacillus* is *aerobic*, i.e., requires air or oxygen from the atmosphere to live. The bacilli are divided into classes that are *ana*-aerobic, *semi*-ana-aerobic (?), and aerobic, meaning without atmospheric oxygen; sometimes requiring oxygen and sometimes not free oxygen; the last as we have above stated.

The method of discovering this *comma bacillus* in the dejections next engages one's attention. It is easily cultivated under aseptic conditions upon a gelatine surface exhibiting the characteristics spoken of above. It is colored by the method known to all bacteriologists, that of Professor Gram.

Solution No. 1, *a*, watery solution of aniline oil; *b*, saturated accoholic solution of Gentian violet. *a* is made as follows: —

Aniline oil, one (1) part;
Distilled water, twenty (20) parts.

Filter. To the clear filtrate (it must be shaken and filtered until clear) add 5 parts of the *b*, i.e., saturated alcoholic solution of pure Gentian violet, to 100 parts of *a*, aniline water, made above.

After drying on a little piece of glass, the dejecta of a patient sick with *Cholera Asiatica* spread very thin, and then immersing it in the solutions, mixed as above, for three (3) minutes, and then for three (3) minutes more in a solution, 2, made as follows: —

Iodine, one (1) part.
Iodide of Potassa, two (2) parts,
Distilled water, three hundred (300) parts. } solution 2

until all color seems to disappear; then dry the little glass and view under a microscope to 1,000 diameters; the *comma bacillus* will be larger than an ordinary comma (,).

When we really find this *comma bacillus*, then the patient has the epidemic cholera. Upon this fact is founded all the advance in our treatment of it. Here the scientific value of hygienic and sanitary regulations becomes apparent. Pardon me just here for referring to the recent work of Professor L. Brieger, the president of the Medical Section of the Imperial Institute for Infectious Diseases at Berlin, Germany, upon the immunity from the fatal effects of *Cholera Asiatica* which he has been able to produce in Guinea-pigs. The microbes of cholera, technically *cultures*, were raised on agar-agar gelatine, put into peptonized meat-broth, and kept upon ice several days, then injected into the Guinea-pigs, about four cubic centimeters, for five or six days successively, when they could withstand the cholera cultures which, when given to other *unprotected* Guinea-pigs, quickly produced death.[4] Of course, this immunity of the mammal, Guinea-pig, presents a vista of relief by protection similar to that given to us by vaccination from small-pox, and promised by "Koch's tuberculin" in the treatment of consumption (Tubercular Phthisis). We look forward to that day of *scientific* medicine.

The careful, methodical German has been directed by his imperial officers to be very careful in personal hygiene and to observe to the letter the regulations in the case of those sick from *Cholera Asiatica*, while the doctors have been compelled to carefully examine each case by the methods above given, and, if unable to do so, to send some of the diarrhœal fluids to the district police stations to be examined at once at government expense — so careful are they to determine what the disease really is. Then the patient must be isolated, his nurses rendered strictly *a*-septic before being allowed to leave the apartments, all the attendants to be washed in solution of carbolic acid twice daily, and the patient too. No eating, drinking, smoking, or anything in contact with the mucous intestinal tract, such as mouth or nose, allowed in anyone except under strict *anti*-sepsis.

By this means it has been possible to prevent the spread of the disease to another case, if *discovered in time*. This element of *unwell*, but not *ill*, persons with *Cholera Asiatica* is the problem; the half-sick ones damage to the utmost hygienic arrangements, and bring disgrace on the attempts of "State" medicine to prevent its spread. This brings one to the application in a more extended sense of isolation or detention in quarantine of numbers of people. This is a troublesome problem to successfully solve; it is now taxing all the wit and wisdom of our land. We trust it may be successful.

[5] The best disinfectants are:—

1. Lime-water; a quantity equal to the amount of the stool and allowed to cover and remain upon it one hour. 2. Chloride of lime (small boxes); two tablespoonfuls on each stool and allow to remain on it twenty minutes before cleansing the utensils, then washed with lime-water. 3. A soft soap of potash, mixed with 5 per cent of crude carbolic acid solution. This to be used for all vessels, clothes, clothing, both body and bed. 4. A one per cent solution of carbolic acid for bodily bathing of patient and nurses. 5. Daily scrubbing the floor and furniture with lime-water, and two hours afterward with a one per cent carbolic acid solution in the patient's room. 6. A boiling of an hour of all clothing. 7. All the shoes, effects, etc., in the room of a patient either afflicted or dead from *Cholera Asiatica* shall be disinfected and not used for ten days.

The conclusion of the matter is:—

Live carefully; keep away from those afflicted with the disease, except specially protected as aforesaid; keep clean; isolate the patient and his attendants.

Harrisburg, Penn., Sept 13.

[1] Berl. Klin. Wochenschr., 1884, Nos. 31, 32, and 32*a*.

[2] Dr. Carl Gunther's Bakterol: Leipzig, 1890. Pl. viii., Fig. 47.

[3] Bakterol: Diagnos: Eisenberg, Hamburg, 1891, p. 256.

[4] Deutsch. Med. Wochenschr., 1892, No. 31 (Aug. 4, 1892).

[5] Regulations of Minister of Interior, Germany, Aug. 1, 1892.

FLORIDA PITCHER PLANT.

BY CHARLES B. PALMER, A.M., COLUMBUS, OHIO.

AMONG the many curious and interesting objects which came under my notice during a residence of several years in Florida, none interested me more than an insectivorous plant (*Saracenia variolaris*) which is common about Orange Heights, in eastern Alachua County. I have no reason to suppose that it is limited to this locality, but this is the only place in which I have observed it. It is a modest plant, seven or eight inches in height, growing in damp situations among the coarse grass of the pine woods.

It bears a single radical flower, the most striking feature of which is the style, which expands into a broad umbrella, entirely enclosing the flower. But it is not of the flower, but of the pitcher-like leaf that I wish to speak.