CRYSTALS.

Most of the metals assume, under certain conditions, a crystalline form, and those particularly which are found native occur frequently as crystals. The Lattrobe nugget, at present in the Natural History Museum, is a magnificent instance of crystals of gold. It consists of natural golden cubes, welded, is it were, together in one mass. Among the metals, bismuth is remarkable for its tendency to crystalize, and by following the directions given, a crystalline mass of bismuth is readily obtained. Take about a quarter of a pound of the commercial metal and melt it either in a small clean iron ladle or over a Bunsen lamp in a porcelain crucible; when quite melted, set the ladle or crucible on a cold metal surface. Let it remain perfectly still, and watch the bismuth carefully, until it is seen to solidify round the edges, then quickly pour out the metal still remaining liquid, and you have the whole of the interior lined with more or less perfect cubical crystals of bismuth. There is one striking peculiarity about these crystals, however. They are but skeleton crystals; the lines forming the edges of the cubes are there, but there is a depression in each face of the crystal evidently not as yet filled up. The growth of the crystal was arrested by pouring out the still liquid metal, and there we have not only shown us the shape of bismuth crystals, but also the manner in which the crystal grows.

For purposes of comparison, try now to make sulphur crystals. To do this, melt down roll sulphur in the ladle or crucible, using, however, a very gentle heat, and not prolonging it beyond the point at which the whole of the sulphur is melted; allow to cool in the same manner as with bismuth, wait until a crust has formed over the surface, and then immediately bore two holes through with a red-hot wire, the one for the liquid sulphur to run, and the other to admit air. Pour out the sulphur still remaining liquid, and cut carefully round the upper crust with a penknife, remove it, and the whole of the interior is interlaced with delicate needle-shaped, amber-like, crystals of sulphur. Here, then, are two substances, of widely different appearance and properties, both possessing in common this property of crystalizing, but with each there is a definite shape. Further experiment and observation teach us that the form of a crystal is as characteristic of a body as any other property it possesses. In the next paper the writer proposes to give further directions for the preparation of crystals, and hopes to add sketches of crystals as viewed by the microscope.—*W. Jago, in Knowledge.*

MANUFACTURE OF GREEN TEA IN INDIA.

A correspondent of the *Indian Tea Gazette* says:

"Manufacture can be commenced as soon as the leaf is plucked, but as it is more convenient to manufacture a day's plucking at once, the leaf plucked during the day is allowed to be all night in the leaf shed, spread out from two to four inches deep, and is constantly turned over to prevent heating.

"The manufacturing process is as follows: A large iron *karai* or pan, 36" diameter by 12" deep, is heated almost red hot, and when ready is filled with green leaf, which is rapidly turned about to prevent burning, until it has become quite soft, and the mass reduced to about half its former size. This process takes about three minutes. It is then thrown on the rolling table, and while the next panful is being prepared, is rolled by the tea makers. As the leaf is perfectly soft and flaccid, the rolling is done in the same time as the panning takes. If there is any sun, the rolled leaf is then thinly spread out in it until it becomes a blackish green and is very stickly to the touch; or if cloudy is put in *chalnees* over charcoal fires until in the same condition. It is then put into smaller iron pans, 25" in diameter by 12" deep, which are only heated to such a degree that the hand cannot be kept on the iron. These pans are about half filled, and the leaf is kept turning over until it has become quite soft again, when it is again rolled. When the day's batch has all been rolled a second time, the small pans are filled to the brim, the heat being gradually lowered, and the leaf is cooked, being constantly turned about as before for about four hours, when it is almost dry to the touch. If a large quantity of the two classes of gunpowder are required, it is then screwed up in bags as described by your correspondent, but this is not necessary nor indeed advisable at present, as the gunpowders do not bring the same prices as young hyson and hyson, a quantity of which classes become gunpowder in the screwing. The tea may now be left for weeks in the bins before being classed and colored, but we will suppose that next process takes place next morning. The small pans should be heated to the extent of burning the hand if kept on the iron for a short time, and about half filled with the tea, which is worked rapidly from side to side until it assumes a light greenish tint, which will take about an hour and a half. It should then be classed, fanned, and picked. Before being bagged for market, about the same quantity is put into the pans, heated to the same degree as before, and is again worked rapidly to and fro for about two hours until it has assumed all the bloom it will take—usually a whitish green; but if the leaf is hard and old when plucked, the color will turn out yellow green, and will require coloring matter, usually pounded soapstone. It is in this last panning that the coloring matter is put in, but I believe that the Europeans in this district do not use it unless requested to do so by the native buyers. It is easily detected by taking a handful of unadulterated tea and breathing on it, when it will be found that as the damp dies off the bloom will return, but will entirely disappear in adulterated tea. The tea is then packed hot in 200 lb. bags composed of an inner cloth and an outer gunny bag, and is dispatched in this state to market. In heating the pans, wood is always used, and it is quite as efficient as and much cheaper than charcoal.

AN INTERSTELLAR RESISTING MEDIUM.

O. Backlund recently made a brief report to the St. Petersburg Academy on his investigation of the hypothesis of a resisting medium in space, from which the *Naturforscher* extracts the following:

Encke's hypothesis of a medium filling interstellar space has met with no serious opposition from scientific men. Encke himself thought that it received strong confirmation from the theory of the comet that also bears his name. Asten, who has continued the theory of these comets since 1848, advocated Encke's hypothesis, and believed that his results offered a still stronger proof of the correctness of the hypothesis. Encke first found that the periodic time of the comet referred to decreased by time proportional to the square of the time, and he proposed this hypothesis: Interstellar (or interplanetary) space is filled with some substance that gravitates toward the sun, and its density decreases inversely as the square of the distance; it therefore offers resistance to the motion of the heavenly bodies, which is proportional to the square of their velocity. It can be proven mathematically that such a medium must cause secular as well as periodical disturbances in their mean motions and eccentricity, but only a periodical one in the length of the perihelion. The period of the periodical disturbance agrees with the orbit, but such a medium has no effect on the inclination of the orbit or on the nodes.

Since Encke only took strictly into account the disturbance that took place in its mean motion, and did not investigate the periodical members of this disturbance, the theory of the comet named after him afforded no proof of the correctness of the hypothesis; for, if we are to adhere to the existence of a resisting medium, an infinite number of suppositions can be made concerning the properties of this medium, all of which shall fulfill the requirements mentioned.

An essential limitation of the possible number of hypotheses has been established by Asten's investigation, inasmuch as he independently deduced the secular disturbance in its mean motion and eccentricity from the observation.

The results of my investigations regarding this resisting medium are of a negative character, and can be summarized as follows:

As yet the treatment of the theory of Encke's comet has really proved nothing regarding the existence of a resisting medium in space.

If any one should succeed, on any hypothesis whatever, in explaining the increased mean motion, and the decreased eccentricity, during the interval between 1819 and 1848, so simple a hypothesis will not suffice to explain the course of the comet of 1865, inasmuch as the mean motion has very probably changed since that time. After the phenomena from 1865 to 1881 have been fully worked out, and their relation to former phenomena ascertained, it will probably be impossible to find out the nature of the hitherto unknown forces acting upon comets.

THE diamond is highly electric, attracting light substances when rubbed, and, after long exposure to the sun's rays, becomes phosphorescent in the dark.

IT is observed that trees in the peach gardens of France, grafted on plum stock, ripen their fruit at least ten days earlier than the same variety grafted on a peach stock.