The English and French astronomers obtained a series of coronal negatives. Some of these extended to its outer limits, and some of those of the coronal spectrum contained several bright lines. The meteorological observations showed a rise in barometric pressure of 0·02 inch, the rise in humidity was five per cent., the temperature fell to that of night, the direction and velocity of the wind were uniform, and the observations on radiation showed that the reception of heat by the earth was almost entirely checked.

Even these barren items of information are of exceeding interest, and will furnish admirable material for thoughtful study until the official accounts are made public, and a wonderful story of personal experience, observation, and devotion to science will be related that will find admiring listeners all over the civilized world.

The astronomers enjoyed excellent health during their long trip. After the eclipse, the Hartford returned to Caroline Island and carried the American party to Honolulu, from whence they took passage to San Francisco and home.

HOW SCREWS ARE THREADED.

Screw threads are "originated" in the lathe usually. All lathe turning, with regular—constant—feed of the turning tool, is screw cutting, or threading; the tool cuts a spiral around a revolving cylinder.

It is evident, therefore, that by increasing the speed of the feed relative to that of the revolving cylinder, and having the point of the cutter properly shaped, a screw thread would result, instead of a paring off of the entire surface of the cylinder. All important actuating or working screws, as those for feeding on machine tools, are formed in this way, and large numbers, also, of ordinary machine screws, which when once seated are expected to remain *in situ* until the machine or implement of which they form a part is worn out.

Wood screws, as screws for fastening wood to wood, metal to wood, etc., are threaded in a similar manner, the thread being cut from the solid by a single cutter removing the material between the threads.

Large numbers of screws are threaded by dies, which may be called hollow screws, or nuts with cutting edges. These, by rotating, form the feed as well as the cutting device for threading the smooth cylindrical rod or bar. Some of these dies are worked by hand, others by power, but in either case the cut, by the modern and improved dies, is clean, and the thread is formed from the solid. The old fashioned dies were adjustable so as to be "set up," and could be made to cut several sizes of diameters. Much of their work was done by pressure, or squeezing, and a part of the thread was raised" instead of being cut from the solid material. There are adjustable dies made now, but they are so formed as to do solid cutting.

There is another method of cutting threads direct from the solid, and that is by milling. It is the invention of the late Eli Horton, the chuck man of Windsor Locks, Conn. The machine is entirely automatic, the blank to be cut being rotated as in a lathe, and a rotary milling tool rotating against it at an angle adapted to the pitch of the thread desired. As the blank revolves slowly toward the cutter, the cutter revolving more rapidly forms the thread by being fed along over the blank as is the cutting tool in a lathe. The milling tool is so formed in cross section as to produce any shape of thread desired. This method is still in use by the successors of Mr. Horton to thread the steel screws of their chucks.

Threads on large cast iron screws are sometimes formed simply by being cast, and formerly there was much cheap small work of that sort in the market.

Threads may be raised by forging in dies, and some good work by this is produced. In both these cases, however, an after finish in the lathe is desirable.

For some peculiar purposes threads are formed by twisting a square or a flat bar; a common form of hand drill that has superseded the bow drill being a case in point. The stock of this drill is a bar, square in cross section, twisted, and which is rotated by sliding a loosely fitting nut rapidly back and forth over its length. A familiar instance of a screw thread of this description is the ordinary auger or bit, the cross section of which is a flattened parallelogram like a flat bar.

One peculiar method of forming screw threads remains to be mentioned. It is that of raising a thread by rolling between dies under pressure. There is a great deal of what is known as "bright wire goods" in the market, which are threaded. In many cases these threads are formed by simply rolling—one revolution, or a little more—the wire between two hardened steel plates that are corrugated spirally to form, when combined, a continuous thread. Sufficient pressure is applied during the rolling—which, however, is very rapid—to raise the metal from the annealed wire enough to make a thread. In this case the threaded portion is considerably larger than the stock or wire, at least half the depth of the thread on each side.

The threads in nuts are produced either by the "originating" method, cutting them in a lathe, by being tapped, or sometimes by being cast of soft metal, as brass, on a threaded core of hard metal, as iron or steel. But nuts are mostly threaded by tapping, running one, two, or three successive taps through them either by hand or in a power machine. Nuts of very thin material, as sheet brass for lamp tops, jar covers, etc., are formed simply by rolling between spirally corrugated rolls, a work analogous to "beading" on tin ware.

D'ARREST'S COMET.

[Translated for the SCIENTIFIC AMERICAN from *Ciel et Terre* of the 15th of April.]

On the 27th of June, 1851, D'Arrest discovered at Leipzig a very faint comet. After following its course for a fortnight, D'Arrest and Yvon Villarceau announced, almost simultaneously, that the orbit of the new comet was elliptical, and that it must be ranked among periodical comets that return at regular intervals to perihelion, the only time when they are visible. The comet was observed for three months. Yvon Villarceau, from the computation of its positions, assigned to it a period of about six years and a half, and an orbit that at aphelion approached very near the orbit of the giant planet of our system, the mighty Jupiter, whose mass is nearly 340 times greater than that of the earth, and whose attraction must consequently exert a powerful influence upon the path traversed by the comet, and complicate the determination of the successive epochs of its return.

It is difficult to form an idea of the length and tediousness of the process required by these mathematical calculations. The task was, however, undertaken, and, on the 1st of June, 1857, Yvon Villarceau announced the return of the comet during the winter of 1857–58.

According to the ephemeris issued at the same time with the article in question, he also announced that the comet would not be visible in the northern hemisphere, and notified observers in the southern hemisphere of the results of his work, that they might be on the watch for the erratic visitor. On the 4th of December, 1857, Sir Thomas Maclear, of the Cape of Good Hope Observatory, detected a faint comet in the neighborhood of the position assigned to it.

In July, 1861, Yvon Villarceau published a new paper concerning the comet's orbit. He predicted its return to perihelion on the 26th of February, 1864, but declared that its faint luster and small angular distance from the sun would probably render it invisible. This prediction was fulfilled, and the return of 1864 was not observed.

The next appearance of the comet was announced for 1870. M. Leveau calculated the probable orbit for this epoch; following the plan of M. Yvon Villarceau, he introduced into his calculations an indeterminate quantity from which he selected three probable values that gave him three different ephemerides. In spite of the great perturbations caused by the attraction of Jupiter between the returns of 1858 and 1864, and the absence of observations in 1864, D'Arrest's comet was detected by Winnecke at Carlsruhe on the 31st of August, 1870.

Its position was in right ascension 16 h. 38 m. 3 s.; its declination was 10° 39·8' south. One of the ephemerides of M. Leveau had assigned to it for this epoch a probable position in right ascension of 16 h. 38 m. 18 s., and in declination of 10° 41·1' south. The agreement between calculation and observation is remarkable.

Finally, the return of 1877 was observed at Marseilles on the 8th and 9th of July. The return of the visitor is expected during the present year. It has even been already announced, but the news proved to be without foundation, and the celestial object mistaken for D'Arrest's comet is a faint new nebula.

The reader will, perhaps, ask what scientific interest there can be in announcing the return of periodic comets. After the brilliant confirmations of the law of universal attraction that have been furnished by phenomena of various kinds, of what use is it to build monuments of figures in order to predict the return of a comet? At first sight it would seem that such labor is unwarrantable, and without direct utility.

We must, however, discard such conclusions, for they are in contradiction to the essentially perfectible character of science. Certainly it is no longer necessary to seek in the movements of the planets of our solar system confirmation of the law of universal gravitation; but the utility of the labor in question is not bounded by this law!

A multitude of secondary causes play a part in the economy of the material universe, and the effect of these multiple causes can only be revealed by the constant observation of all the phenomena offered for examination. Each observation constitutes, in some measure, a function of the constant quantities that enter into the great law of universal attraction, combined with the effects of these causes in detail. The accumulation of a great number of these functions will alone allow us in the future to suspect the existence of these causes and to discern the part that belongs to each one of them in the production of phenomena as we observe them. The constant study of facts constitutes the experience of science; this is not lost, like personal experience, but it can be transmitted to our successors to throw light upon their researches in ages to come.

Each comet therefore presents, as it were, a special interest in our studies of the universe. Encke's comet seems to feel the effect of the resisting medium through which it passes. The great comet of 1882 grazed the sun's atmosphere and furnished appreciable elements of the small resistant power of this atmosphere. D'Arrest's comet offers in the same way at every reappearance the possibility of measuring the extent of the perturbations to which it has been subjected, and as it passes exceptionally near to Jupiter it is eminently adapted for furnishing the data of observation relative to the mass—not yet absolutely determined—of this immense planet, which exerts so powerful an influence upon the solar system.

Snakes in Australia.

"Although the bushman has nothing to fear out here from the attacks of any wild animals," says a writer whose knowledge of Australian country life is not to be excelled, "he has still his secret enemies, which in many cases are as dangerous as the open foe; and what he has most to dread in the Australian bush are the snakes." Such is certainly the case. "I do not believe," he continues, "any part of the world can be more infested with these reptiles in the summer season. Let him walk where he will—in the depths of the forest, in the thick heather, on the open swamps and plains, by the creek or water holes—the shooter is sure to meet with his enemy, the black snake. It enters his very tent or hut, and coils itself in his blankets. In fact, nowhere is he safe; and if he did not banish the thought of them altogether from his mind, he would not have a moment's peace.

"It does, indeed, appear as if the eye of a watchful Providence peculiarly guarded the traveler in these wilds; for at any moment he is liable to tread upon a deadly snake, coiled up in his very path, which does not always get out of the way, but lies watching him with his basilisk eye, ready in a moment to make the fatal spring if touched, and very often the snake is not seen until the danger is past." Bushmen soon become accustomed, like the black fellows, to the indications of the presence of a snake, and can see it before reaching it, unless coiled up very snugly. The bush fires destroy thousands of snakes, but seem to make no impression on their numbers. Curiously enough, snakes are not found in New Zealand, although there is no record of St. Patrick having ever visited that part of the world.

A Bolivian Saurian.

"The Brazilian Minister at La Paz, Bolivia, has remitted to the Minister of Foreign Affairs in Rio photographs of drawings of an extraordinary saurian killed on the Beni after receiving thirty-six balls. By order of the President of Bolivia the dried body, which had been preserved in Asuncion, was sent to La Paz. It is twelve meters long from snout to point of the tail, which latter is flattened. Besides the anterior head, it has, four meters behind, two small but completely formed heads (?) rising from the back. All three have much resemblance to the head of a dog. The legs are short, and end in formidable claws. The legs, belly, and lower part of the throat appear defended by a kind of scale armor, and all the back is protected by a still thicker and double cuirass, starting from behind the ears of the anterior head, and continuing to the tail. The neck is long, and the belly large and almost dragging on the ground. Professor Gilveti, who examined the beast, thinks it is not a monster, but a member of a rare or almost lost species, as the Indians in some parts of Bolivia use small earthen vases of identical shape, and probably copied from nature."

Mr. William E. A. Axon, in a note giving the above to the *Journal of Science*, says: "If this account should prove to be accurate, it would form a counterpart to the etching of the mammoth, which forms so interesting a memorial of prehistoric art."

New Explosive.

Herr Koppel has devised a new explosive substance, which he expects to be less costly than any other, to give out no injurious fumes, and not to be liable to explosion by shock or friction. The following is the composition of two kinds, No. 1 being suitable for hard rocks, such as basalt, and No. 2 for softer, such as sandstone:

	No. 1.	No. 2.
Saltpeter	35	42
Soda	19	22
Sulphur	11	12 50
Sawdust	9·50	10
Chlorate of potash	9·50	—
Charcoal	6	7
Sulphate of soda	4·25	5
Prussiate of potash	2·25	—
Refined sugar	2·25	—
Picric acid	1·25	1·50
	100	100

The New Nickels not a Standard Weight for Measure.

The new V nickels are now coming into general use, the word "cents" having been added to prevent their being mistaken, when gilded, for half-eagles. The following, which was true of the old nickel, although it does not apply to the new, is now going the rounds of our exchanges:

"*Five Cent Nickels as Measures.*—A fact probably but little known is that the United States nickel five cent pieces furnish a key to metric measures and weights. This coin is two centimeters in diameter, and its weight is five grammes. Five of them placed in a row will give the length of a decimeter, and two of them will weigh a decagramme. As a kiloliter is a cubic meter, the key of the measure is also a key to a measure of capacity."

Although the new nickel pieces are larger in diameter than the old, they weigh less.

The average weight of those which we have tested is 4·9 grammes, or 75½ grains, while the diameter is 21 millimeters. Both old and new are so nearly two millimeters in thickness that the eye cannot distinguish the difference, hence a very correct idea of a millimeter can be had by taking half the thickness of a five cent nickel.

To give an idea of larger metric measures we may add that the column rules of the SCIENTIFIC AMERICAN are 0·36 meter, or 36 cm., in length, while the editorial columns are 8 cm. wide. The columns of the New York *Sun* and *Times* are nearly 54 cm. long and 6 cm. wide.