Correspondence.

The Transmission of Life from Star to Star.

To the Editor of the SCIENTIFIC AMERICAN:

Under the above title in the SCIENTIFIC AMERICAN of March 2 you gave a synopsis of Prof. Svante Arrhenius's theory that "the germs of life are conveyed through interstellar space from one heavenly body to another." His theory seems plausible and his arguments quite convincing, and his concluding thought, that "all organisms in the universe are related, and the process of evolution is everywhere the same," is splendid. But if his theory is true, it does not solve the problem of life—it simply pushes it farther from us into time and space.

If life came to our planet, to our solar system, from other worlds, that does not explain its origin. To me it seems beyond conception that life did not at some time and in some place have a beginning. When it began it must have been by spontaneous generation or by special creation. The professor shows quite conclusively by quoting high authorities that all the theories for spontaneous generation have been discredited. So does this not leave the special creationist still "on top" in the controversy? C. W. BENNETT.

Coldwater, Mich., March 2, 1907.

The Korn Photographic Facsimile Telegraph.

To the Editor of the SCIENTIFIC AMERICAN:

The description of Korn's telephotographic apparatus in the SCIENTIFIC AMERICAN of February 16, 1907, mentions a truly marvelous property of selenium, which appears to indicate that this old favorite is determined not to be outdone by radium or any other upstart. The writer states that selenium "is not only sensitive to varying intensities of light in its electric conductivity, but is also affected thereby in its resistance." Hence the necessity of employing a second selenium cell with the same sensibility "in the opposite direction." In the new apparatus, furthermore, the needle galvanometer is replaced "by one of the chord type," but the function of the galvanometer is not given, nor does it appear in the diagram. Again, in the receiving apparatus the beam of a Nernst lamp is focused on a Geissler tube which is in the electric circuit, "and the variations of the current are thus retranslated into variations of light." *This* statement agrees with the diagram, which represents the Geissler tube as being energized directly by the feeble current from the distant sending station!

In the older form of receiver, as described in the SCIENTIFIC AMERICAN of November 25, 1905, p. 417, there were a Tesla inductor and tube, and the galvanometer, traversed by the varying line current, "according to its position switches more or less resistance into the Tesla circuit."

According to a description and diagram in La Science au XXme Siècle, January, 1907, the variation of resistance is effected by varying the length of two spark gaps, each of which extends from a fixed electrode to one end of a rod carried by the galvanometer needle. The current through the tube and spark gaps is furnished by a Tesla apparatus and no Nernst or other lamp sends its beams through the tube. The property of selenium which the second cell is designed to compensate is referred to as *inertia*, or retention of light—that is, slowness of recovery. The action of this second cell is not explained nor is it shown in the diagram, which is probably of the older apparatus, but reference is made to a paper read before the Académie des Sciences on December 3, 1906.

LAWRENCE B. FLETCHER.

Marlborough, N. Y., February 19, 1907.

The Two-Cycle Motor.

To the Editor of the SCIENTIFIC AMERICAN:

Referring to the article in the Motor Boat number of the SCIENTIFIC AMERICAN by Commodore Willets, I wish to state that it is not yet a settled fact that the four-cycle engine is the ideal for marine propulsion. This matter is far from being settled. It is the honest opinion of the writer (who has been connected with the development of marine engines for fifteen years) that the two-cycle type of internal combustion motor will in time enjoy the most general adoption for boat propulsion, because of the favorable features it presents for this purpose. The four-cycle engine has had the attention of engineers to a great extent, while the two-cycle has excited little interest; this is because of business reasons. A firm dislikes to bring out something new if it can copy or follow something that has been tried. However, the fact that something else has not had a fair trial is no evidence that it is of less value. There is a large number of reputable shops now giving their attention to the two-cycle, not only for heavy marine work, but also for stationary operation, such as electric drive, and these firms should receive some encouragement from government engineers, as well as from the public, when they can show results.

No engineer will doubt that the principle of a two-cycle engine is far superior to that of a four-cycle, because of its ability to operate at variable speeds and at very slow speeds. It also inherits the ability to reverse instantly without the addition of complex mechanism; the construction of a two-cycle engine is extremely simple as compared with that of the four-cycle, and best of all it has the great advantage of an impulse at every revolution per cylinder, which produces a more even torque and approaches the turbine principle in reducing vibration. The fact of the increased number of explosions per cylinder permits of a smaller cylinder and stroke per horse-power. One of the disadvantages of the four-cycle lies in the overheating of the exhaust valve, a fault which is entirely overcome in the two-cycle.

There is no question but that in time the two-cycle engine will become the standard motor for vessels; and with careful designing, together with improvements such as means for scavenging the cylinder with air at each stroke and using producer gas as fuel, it needs only the attention of the builders to bring it to the front. A READER.

Oshkosh, Wis., February 28, 1907.

The Bite of the Gila Monster.

To the Editor of the SCIENTIFIC AMERICAN:

Having read your article about Gila monsters in the SCIENTIFIC AMERICAN of January 26, I desire to state that I know one of the cases mentioned to be true. I have had some experience with Gila monsters, and can state that no matter what scientists may claim, the Gila monster is a good thing to shun. Indians and Mexicans have a horror of them, and fear them more than a rattlesnake. Old settlers here know of many cases of Gila monster poisoning, in which the effect was death. I believe that the bite of the Gila monster is dangerous because of the creature's habit of eating lizards, bugs, and rodents, and then lying on sand so hot that it blisters the hands and feet. The heat causes the food to putrefy in the stomach, evidenced by the fact that the teeth are often covered with a fermented, putrefied froth from the food. A bite has the same effect as the cut of a dissecting knife used on a cadaver; in other words, the inoculation of a deadly poison.

I spoke of the sluggishness of the Gila monster to all appearances as it lies in the sand after a feast. This is true within certain limitations. Most people do not know the Gila monster, and have never seen him in action. When frightened or angry, he can move quite rapidly, and he develops some traits not generally known. That short, thick, stubby tail of his is apparently merely a heavy tail to drag around to make him more sluggish. The thick tail is used in jumping, just as a kangaroo uses his tail for the same purpose. The Gila monster bites like a bulldog, and has the tenacity of a snapping turtle. Small wonder then that his bite is so dangerous. To cite an instance of his jumping powers, I may mention that I once saw some men teasing a Gila monster brought to Tucson. A string was tied around his neck, and a crowd naturally gathered out of curiosity. The Gila monster was crawling around on the ground, trying to get away, but was pulled back by the string. This was carried on till the creature became furious. The crowd around the Gila monster knew nothing of his power to spring. Suddenly he sprang up and bit a man among the crowd on the hand, leaping fully two feet from the ground. The monster was crawling at the time, and the string was slack so that it was not jerked up in the air. I may here record still another instance. This of a man whose chief object seems to have been a bravado display of fearlessness. He was holding one of the monsters in his hand by the back of its neck, so it could not bite him. He dropped his hand to the side of his leg. The Gila monster shut his teeth down on his heavy duck overalls, taking a double piece out where the cloth folded, as quick as a pair of scissors could have cut the fabric, and as cleanly.

The Mexicans and Indians after killing a Gila monster always hang it up by the neck on a bush so that it cannot possibly touch its feet, and leave it till it is flyblown or smells before they will trust to its being dead. The creatures apparently are hard to kill or else feign death. HENRY M.

Tucson, Ariz.

A Quick Method of Repairing a Broken Shaft.

To the Editor of the SCIENTIFIC AMERICAN:

The writer recently, almost by accident, hit on a method of repairing a broken shaft, so cheap, so quick, and so surprisingly strong, that he thinks it may be of service to your readers. The use of the method would often obviate a long and expensive delay and loss of work, for the shaft gives nearly as good service as before it was broken. The SCIENTIFIC AMERICAN is so universally read, that no better medium to put it before the mechanical public could be found, and hence it is offered to you in the hope you may find it of sufficient interest to print.

To be brief, the writer has under his charge a hydraulic dredge, used on the Mississippi River improvements in the vicinity of Keokuk, Iowa. This dredge is driven by a compound high-pressure engine, 14 and 24 by 15-inch stroke, running 220 revolutions per minute and developing about 250 horse-power. The steel shaft of this engine, 6 inches in diameter, broke about 10 inches from one of the cranks. The cranks are quartering, and the shaft is a highly finished one that takes a long time to build even under the best of circumstances. It was, as you can see, a difficult task to weld this shaft so as to repair it, as the stub-end was so close to the crank that to heat it sufficiently was likely to warp the latter out of shape and spoil the whole shaft. The attempt was made, however, and the shaft promptly broke again at the same place, although a whole week and a large expense had attended the effort to put the shaft in working condition. It looked as if the crew of sixteen men would have to be given indefinite furloughs, and the dredge laid up for at least six weeks while a new shaft was being built. The broken shaft was taken out, and was lying on the shop floor for measurement for the purpose of ordering a new one, when a casual traveling man happened to come along with some sort of engineering merchandise to sell, and heard the history of the shaft. He remarked that he had once mended a similar break in a cold-storage engine shaft, where it was of the utmost importance to keep the machinery at work. This shaft was, like ours, broken too close to the crank to permit of welding, owing to the springing out of shape that would take place if heated. He said that, more in the hope of doing some good than with any expectation that it would last, he simply squared the two broken ends and screwed them together with a stud that went half into each piece of shaft. He said that they started the engine, and, to the surprise of every one, the shaft seemed as good as before breaking. They got a new shaft, but they did not take time to put it in, waiting to see the mended shaft give some sign of breaking. It ran the season out, and was still apparently fully up to its work, when they finally put in the new shaft; not because the old one showed any weakness, but "just to avoid trouble."

This tale was no sooner concluded, than my broken shaft was put into the lathe, and work begun on it to make a similar repair. Squaring the ends shortened the shaft some six inches, but this could be remedied by moving in the outboard pillow block. A chunk of soft and tough steel, that had once done duty as a wristpin for a large engine, was selected from the scrap pile. This was cut off 10 inches long and turned to 4 inches in diameter; it was then threaded the whole length with a screw of four threads to the inch; each piece of shaft was then bored and threaded to fit this screw, and then finished the stud was screwed into one piece of shaft, and the other piece screwed home. To make the job a little more solid, the stud was dipped into salt and water to make a rust joint of it, and keep it from coming unscrewed by any chance.

It took an afternoon and part of the night to complete this job, and the next morning the shaft was replaced in the engine and put to work. It has never shown the least indication of weakness so far, and is still, after eighteen months, apparently as good as ever. The new shaft, ordered as a hurry job, was received in two months, but is still kept in reserve. The joint between the two pieces of shaft was fortunately an inch or so inside of the pillow block, and is now undistinguishable from the rest of the shaft. The work of the engine, of course, always tends to screw the pieces tighter together; but it seems a little surprising that the threads do not strip off and let the two pieces separate. Probably the friction between the outer parts of the shaft takes up most of the torsional strain. The 4-inch stub would not last a minute by itself.

It suggests the idea that a shaft may be lengthened almost indefinitely, and do good service without any couplings, by simply screwing the ends together. This would in many cases be a great convenience. The experience on this engine at least goes to show that it is a method of uniting pieces of shafting far stronger than is generally supposed. It would be of interest to have tests made with pieces of shafting made for the purpose, to see what proportion of the original strength of a shaft this method of uniting them gives.

I would give the name of the ingenious man who suggested this repair, if unfortunately he had not gone the way of other drummers and been forgotten. I send with this a scale drawing to show plainly just what the joint looks like, together with the break in the shaft, and hope that some one may find the idea as valuable as it was to the writer. There is no reason why the shaft need to have been shortened, as a short piece of shafting with a stud on each end might just as well have been used, and would probably have been just as strong. MEIGS, U. S. C. E.

Keokuk, Iowa, December 17, 1906.

The French Minister of War has ordered a census to be taken of industrial vehicles capable of being mobilized for military transport. The wagons will be divided into three categories, according to the load carried. Public service vehicles will also be included.