## Correspondence.

### On the Bodies Associated with Biela's Comet.

*To the Editor of the Scientific American:*

Did the different bodies moving nearly in the orbit of Biela's comet (1826 I) enter the solar system as a single mass, or as a cometary group? The former alternative has been hitherto assumed. The latter, however, may perhaps be found at least equally probable.

The hypothesis of a primitive cluster was proposed, with some hesitation, in *Nature*, May 1, 1873. Let us now consider, somewhat more in detail, the principal facts by which it is supported.

1. It has been shown by M. Hoek, of Utrecht, that certain comets, which have approached the sun singly, existed as cometary systems in the interstellar spaces. Meteors and aerolites are also believed to have sometimes entered the terrestrial atmosphere as clusters. There is, therefore, nothing improbable in supposing the bodies of the Biela group to have been distinct and separate masses before their orbits were changed into ellipses.

2. As there seem to be at least three comets and two meteor clouds now moving in orbits nearly identical, it is highly probable that their united masses would have formed too conspicuous an object to have entirely escaped observation.

3. Was the first comet of 1818, as suggested by Dr. Weiss, connected in its origin with that of Biela, and, if so, can any previous return be identified? The computed elements of the comets, 1772, 1818 I, and 1826 I, are as follows:

| Perihelion passage. | Arg. of perihelion | Ascending node. | Inclination. | Perihelion distance. | Eccentricity. | Direction of motion. | Date of discovery. | Discoverer. | Duration of visibility. |
|---|---|---|---|---|---|---|---|---|---|
| 1772, Feb. 8 | 97°21′ | 263°24′ | 17°39′ | 0·9118 | 0·6769 | D | 1772, Mar. 8 | Montaigne | 3 w'ks |
| 1818, Feb. 7 | 95°7′ | 250°4′ | 20°2′ | 0·7332 | 1·0000 | D | 1818, Feb. 23 | Pons | 4 days |
| 1826, Mar. 18 | 109°45′ | 251°28′ | 13°23′ | 0·9025 | 0·7466 | D | 1826, Feb. 27 | Biela | 8 w'ks |

The elements of the first are by Gauss, and were obtained by direct calculation, without any assumption in regard to the period. The observations, however, as well as those of 1818 I, were very imperfect, and hence the elements are liable to considerable uncertainty. The resemblance is so striking as to render it highly probable that the comet of 1818 is intimately related to that of Biela. It is also probable that the comet of 1772, which has been regarded as a former return of Biela's, is really identical with that of 1818. The two dates of perihelion passage correspond to a mean period of 2,400 days. The question may be decided by calculating the perturbations between 1772 and 1806.

4. The comet whose discovery on the 2d of December, 1872, is due to Klinkerfues and Pogson, may be regarded as still another member of the same family. Its perihelion passage occurred nearly three months after the time predicted for that of Biela—a lengthening of the period which it is impossible to explain by any known disturbing cause.

5. When several bodies with slightly different periods revolve in orbits nearly coincident, collisions must sometimes occur between the various members of the group. If Biela's comet overtook, or was overtaken by, another of the same cluster in 1845, their separation after partial impact may have been the phenomenon observed at that epoch. The meteoric showers derived from this zone are the following: 1798, December 7th; 1830, December 7th; 1838, December 5th—7th; 1850, November 29th; 1872, November 27th. These dates appear to indicate the existence of two meteor clouds; the first, third, and fifth showers having been derived from the one, the second and fourth, from the other. The division of the comet may have resulted from its collision with one of these meteoric masses.

6. If we trace back the positions of Jupiter and Biela's comet, we shall find that they were in the vicinity of each other about September, 1734. This is the most recent date, previous to the apparition of 1772, at which they could have been in close proximity. That the members of this cometary cluster were at that time thrown into their present orbits seems probable from the fact that they have not yet become widely separated, as must have been the case if they had made a considerable number of revolutions. It is also worthy of remark that the earliest observed star shower derived from this source occurred less than 80 years since; whereas the meteors connected with the comets 1866 I and 1862 III may be traced back to the ninth century of our era.

Bloomington, Ind. DANIEL KIRKWOOD.

### Professor Haeckel on Embryology.

*To the Editor of the Scientific American:*

In your issue of June 7, 1873, is a criticism upon Professor Haeckel's investigations concerning the embryology of man. Your correspondent, in his article, says, "certain theories" of Professor Haeckel's; while the Professor, in his article, uses the words "the following facts," etc. It is evident that J. L. has not a right understanding of the Professor's ideas, or, if understanding them, has an utter want of toleration. The Professor says nothing of "forming quorums, or nominating committees." But in a clear and concise manner, he sets forth the results of his investigations. J. L. may be very witty or keenly sarcastic when he speaks of "monkeys and winged individuals clothed with hair or feathers as the case may be," etc. But if he will look at the works of creation, he will find that the immutable laws of Nature invariably grow hair or feathers where "circumstances demand it." But there are exceptions to all rules, and in some cases there is a demand for common sense which Nature has failed to supply.

There must be evidence before belief, and there must be scientific investigation into the unknown, theory, before facts can be established. It does not follow that scientists do not acknowledge the Supreme Being because they do not use His name in every other line they write. The scientific man sees certain actions of the elements around him, which action begins in the yet invisible; and, as it emerges to the vision, it takes the form of man or monkey, according to the combination of the element producing the form visible. In the investigation, the scientist finds that everything in Nature works harmoniously. And because he will not deny what he can see, and look for the cause of causes, which he might do *ad infinitum*, J. L. flies to the rescue of theology, evidently thinking that of more importance than a right understanding of the laws of creation, through which knowledge, only, can we ever have a correct understanding of our being and our Creator. If every scientific investigator on the globe were to acknowledge God as the prime cause of all created things, it would not strengthen their deductions in the least, or give the facts any firmer foundation.

The cell theory has been under investigation for fifty years, by learned men of all countries; and such investigation has established the fact that all matter is made up of cells or atoms. In the last few numbers of your paper, it has been conclusively shown by our honored Agassiz that the cell theory is correct.

One glance through a good microscope ought to convince the most skeptical. It is possible that J. L. might become an unreasonable person should he look through the microscope and see what the investigations of fifty years have brought to light. I have read of an instance where a person (I suppose "reasonable") refused to look through a telescope, lest he should see what he had denied to be true. The same spirit has followed the scientific investigator from Galileo down to the present day. All matter is governed by immutable law, and every created form is of necessity formed to suit the circumstances of the thing created; different combinations of the elements producing different forms. J. L. claims that, "if the same elements which form the monkey and plants combine to form man, we should look for the original reasoning power in them." It is claimed by some that man is an epitome of the universe. I should infer from that that all the elements are combined in man. A want of the same combination makes the monkey. The very laws of combination forbid the reasoning man to look for complete reasoning faculties in anything below him; but, in proportion as the elements which make the reasoning faculties are combined with the other elements, these reasoning faculties are observed. There are born human beings that have less reason than monkeys. As all matter is made up from the elements, it is self evident that every form is a combination of certain elements. I have no doubt that the chemist will be able, in the future, to show why such a difference exists between a Daniel Webster and the idiot Emerson, and why the same elements should produce a man or a monkey. In the chemical laboratory, the chemist finds that the same combinations invariably produce the same whole. Common alcohol is composed of $C_4$ $H_6$ $O_2$, while $C_4$ $H_4$ $O_4$ produces acetic acid. Thus an exchange of two parts, between H and O, makes a different body.

I fail to see, in J. L.'s letter, one word of argument, supported by fact, against the facts of Professor Haeckel. In this age of reason, railing at men of science or the expression of thought only serves to bring contempt upon him who indulges in it. J. L.'s article has failed to show even a microscopical proof against the article of Professor Haeckel.

Bridgeport, Conn. A. M. W.

### Deep Sea Soundings.

*To the Editor of the Scientific American:*

In your issue of May 31, you describe an invention for deep sea sounding without a rope, made by the brother and nephew of the late Professor Morse, and you add the following remark: "This sounding instrument requires no line, and is, we believe, the first of the kind ever invented."


In 1833, the writer invented and made an instrument, for deep sea sounding, to operate without a line. It consisted of two metallic balls, the one, A, hollow, the other, A', solid. They were each provided with a few links; and to those of the solid ball a lever, B, was attached by which the two balls were readily connected or disconnected. When connected and descending in the water, the long, thin, and broad end of the lever, B, would be raised to a position that would keep the balls connected; but when the solid ball reached the bottom, the lever would fall and disconnect the upper ball, which would return to the surface. The depth would be determined by the time required for the ball to sink and return to the surface. It was my belief that the apparatus would descend at a uniform rate of speed after the first yard or two, and that the light ball would return in like manner. It would only be necessary to know how much time is required for an hundred feet, to know how much would be required for a thousand or ten thousand feet. I experimented with the instrument, so far as I could in a country place, to determine this theory, which I believe to be correct. The invention was noticed at the time by a local paper, the York (Pa.) *Gazette*. *

Springfield, Ill.

THE yearly meeting of the British Association for the Advancement of Science, under the presidency of Mr. Joule, takes place at Bradford, England, on the 17th of September next. The American Association, Joseph Lovefield, President, meets at Portland, Maine, August 26th.

### SUCCESSFUL LAYING OF THE FIFTH ATLANTIC CABLE.

The submergence of the fifth telegraph cable under the Atlantic ocean was begun on Monday, the 16th of June, 1873, by the departure of the Great Eastern from the coast of Ireland, for Heart's Content, Newfoundland, which port she reached June 27, paying out the cable over her stern as she proceeded. Only eleven days were occupied, during which seventeen hundred nautical miles of telegraph cable were laid. This is rapid work. The experience gained within the past few years in the construction and of laying submarine cables and the facilities afforded by novel machinery, relieves the business of all substantial difficulties. Telegraph cables can now be laid under the ocean with apparently as much ease and certainty as land lines can be erected.

Eleven days is not a long trip for a passenger steamer in crossing the ocean.

The success of the Great Eastern suggests the possibility of providing our ocean steamers with means of constant telegraph communication with the land throughout their voyages. From day to day, during the recent passage of the Great Eastern, the public was supplied with intelligence of the ship's progress, and this while she steamed along as rapidly as many of the Atlantic steamers are accustomed to do. Is it beyond a reasonable probability that some ingenious inventor will yet discover a method of making an extremely light but strong cable, which any vessel may easily carry and unreel or take up as she sails? We commend the subject to those who are desirous of obtaining fame and fortune by the exercise of their mental comet-seekers in this direction.

The first Atlantic cable was laid down by the British war ship Agamennon and the American ship Niagara in 1858. Each vessel took on board one half of the cable, sailed to mid-ocean, spliced ends, and departed, one for Ireland, one for Newfoundland. The cable was successfully laid, but its construction was defective, and it ceased operation after a few messages had been exchanged.

The second cable was laid by the Great Eastern in 1865; but before the voyage was completed, the cable broke and was lost.

The third cable was laid in 1866 by the Great Eastern with success, and the second cable was, by the same vessel, also picked up and completed.

The fourth or French cable, from Brest in France to Newfoundland, was laid in 1869 by the Great Eastern.

The fifth cable, as already stated, is the one just put down. The cable consists of seven fine copper wires, insulated in gutta percha covered with jute yarn, and sheathed with wire and hemp, which is passed through Clark's silica compound, an excellent preservative.

### The Hartford Steam Boiler Inspection and Insurance Company.

The Hartford Steam Boiler Inspection and Insurance Company makes the following report of its inspections in the month of May, 1873:

During the month, 1,044 visits of inspection were made, and 2,165 boilers examined, 2,024 externally and 910 internally; 210 were tested by hydraulic pressure. The number of defects discovered in all was 973, of which 210 were regarded as dangerous. The defects in detail were as follows:

Furnaces in bad condition, 38—4 dangerous; fractured plates, 68—37 dangerous; burned plates, 51—14 dangerous; blistered plates, 174—32 dangerous; deposit of sediment, 161—18 dangerous; incrustation and scale, 141—19 dangerous; external corrosion, 63—13 dangerous; internal corrosion, 28—13 dangerous; internal grooving, 33—4 dangerous; water gages defective, 28—4 dangerous; blow-out defective, 12—4 dangerous; safety valves overloaded, 21—16 dangerous; pressure gages defective, 167—13 dangerous; boiler without gages, 1—dangerous; deficiency of water, 11—6 dangerous; braces and stays broken, 46—14 dangerous; boilers condemned as unsafe to use, 10; mud drum condemned, 1.

### Hiram Powers.

The most celebrated of contemporary American artists, Hiram Powers, died at his residence in Florence, Italy, on June 27, aged 68. He was a native of Woodstock, Vt.; and, believing in his own ability as an artist, he quitted a mechanical trade and obtained an appointment at a museum at Cincinnati, where he remained seven years. By the liberality of Mr. Nicholas Longworth, he was enabled to travel to Florence to study; and his career there was first signalized by the production of his statue of "Eve," a work which at once placed him in the front ranks of the world's genius. His "Greek Slave," exhibited at the London Exhibition of 1851, is probably the best known of his works, not only for beauty of expression, but for the vivid animation with which the marble was endowed. His productions are numerous, and have been eagerly sought for by the art patrons and amateurs of both worlds.

Mr. Powers was also an ingenious inventor. Among other devices produced by him was a sculptor's file, in which were arranged, between the serrated cutting edges, holes through which the marble dust could pass away so as not to clog up the tool.

A COLORADO paper gives a very graphic account of the descent of Clear Creek, through the cañon, with its cliffs two to three thousand feet high, by a couple of boys in an open boat. They are reported to have made a distance of one hundred and forty miles in two hours' time, shooting over falls and rapids of from ten to sixty feet in hight, finally bringing up safe on a sand bar, with the boat half full of water.