Correspondence.

The Tarantula.

To the Editor of the Scientific American:

I have noticed in your issue of July 19 (page 39) a brief account of the "Tarantula of California," with an illustration. As my attention has been specially called to this subject, I write to inform you of a popular error which you unwittingly perpetuate.

The tarantula proper, of California (called Mygale Hentzii), builds no nest as depicted in the illustration, possesses very prominent and numerous black hairs (as is peculiar to the genus), and is quite large, often six or more inches across—in fact, usually with a *body larger than the entrance of the so-called "tarantula nests,"* which nests belong instead to much smaller, hairless spiders, with shorter and fewer hairs, and properly called trap door spiders. Of these there are several species in California; the more common species known to me is Cteniza Californica, which is almost destitute of hairs, and whose nests are much sought after by dealers in curiosities, who are very particular to displace the rightful owner and substitute by its side a large tarantula—causing a more ready sale.

The spider in the illustration is perhaps an unpublished species of Antrodiætus, one of our California trap doors, and to which (as also to C. Californica) the name Mygale Hentzii has often been erroneously applied; but it is plainly neither a true Mygale nor Cteniza. A note in *Science* (see Cteniza, in vol. iii.) mentions the facts upon this subject, which however seem little known.

It is not strange that the occupants of so-called tarantula nests should be considered tarantulas, and as such they have been largely collected and sold for the genuine article. The true tarantula is usnally not abundant near the trap doors, so that a collector is very liable not to learn of the fallacy.

I send by this mail a true tarantula, recently found traveling about at dusk. It is imperfect, and about one-third the size often or usually attained. It is often found under stones and rubbish, and on the dry plains it occupies the cracks in the adobe soil, or in other holes (not of its own make as far as known), and is credited with making a tubular web. Little, however, is known about the habits of any of these spiders or even about themselves, as they have never been very closely observed. C. R. ORCUTT.

San Diego, Cal., Aug. 12, 1884.

[The specimen sent by our correspondent is about the size of the one we illustrated, but differs greatly in color, the under side of the body and legs being of a very dark brown, while the remaining parts are of a dark mouse color. It is entirely covered with a fine fur, and upon the legs are long, coarse hairs. In regard to the name of this ugly animal, the American Cyclopædia states that "the great hairy spiders of the genus Mygale are called tarantulas in the Southwestern States," and that "other species in California are called trap door spiders, from their hollowing a more or less conical nest . . . in the clayey soil."]

Meeting of the British Association, Montreal.

It is now fifty-three years since the British Association for the Advancement of Science was formed, principally through the efforts of Sir David Brewster, Sir Humphry Davy, Sir John Herschel, and other leading scientists. The main feature of the association is its annual gatherings, at which members who suppose they have made a real advance in science read their papers for the criticism of others engaged in similar lines of scientific work; reports are also made upon particular departments, their progress and needs, and as a guide to further inquiry. This year, however, affords the first instance of the meeting of the Association outside of the British Isles, and the session which commenced at Montreal August 28 has, therefore, excited more general interest among American readers than any former assembling of the body. It is estimated that some 600 foreign scientists have crossed the ocean to take part in the proceedings of this meeting, not a few of whom have been here for many weeks, making themselves acquainted with the country, people, and institutions in the United States as well as in British North America, and a great many will linger behind after its close, for such purposes as well as to attend the meeting of the American Association, to be held in Philadelphia from Sept. 4 to 11.

Before the opening of the meeting, the Council of the Association invited the standing committees and fellows of the American Association to attend as honorary members, and among the American visitors were Profs. George F. Barker, Mendenhall, Rowland, James Hall, Asa Gray, Smith, of the University of Virginia; Putnam Newberry, of Columbia; Carhart, of Evanston; Newcombe Scudder, of Cambridge; C. S. Minot, Woolsey Johnson, and Bickmore, of the American Museum of Natural History; Commander Sampson, United States Navy, Dr. Youmans, and Lieut. Greely of the late Arctic expedition.

Among distinguished foreigners present were:

Sir William Thomson, Prof. Tyler, the astronomers John Couch Adams and Robert S. Ball, the Rev. Thomas George Bourey, Prof. Roscoe, Prof. Dewar, Capt. Bedford Pitt, Sir Lyon Playfair, Prof. E. A. Schafer, Prof. William A. Tilden, Dr. T. Sterry Hunt, Prof. Dawson, and others of note, although it is to be regretted that many great names, such as those of Tyndall, Huxley, Joseph Dalton Hooker, and Sir John Lubbock, are absent from the list of members in attendance.

The different sections into which the work of the Association is divided were presided over as follows:

Sir William Thomson over the section devoted to mathematical and physical science, with Vice-Presidents Prof. J. B. Cherriman and J. W. L. Glaisher, the aeronautic celebrity; Prof. Sir H. E. Roscoe over the section of chemical science, assisted by Prof. Dewar and B. J. Harrington; geological section W. T. Blanford, and Prof. T. Rupert Jones and A. R. C. Selwyn assisting; in biology Prof. H. N. Moseley, with Surgeon-Major G. E. Dobson and Prof. R. G. Lawson assisting; geographical section, Gen. Sir J. H. Lefroy, assisted by Col. Rhodes and P. L. Sclater; Sir Richard Temple presides over the section devoted to economic science and statistics, assisted by J. B. Martin and Prof. J. Clark Murray; mechanical science section, Sir F. J. Bramwell, assisted by Prof. H. T. Bovey and W. H. Preece; the section of anthropology, Prof. E. B. Tyler as its chief, aided by Profs. W. Boyd Dawkins and Daniel Wilson.

Lord Rayleigh, the President elect, is comparatively a young man to be the president of such an Association, being only 42 years old, but he is Professor of Experimental Physics and of Mathematics in Cambridge University, and his mathematical works have already called forth the praise of the highest living authorities. It is impossible for us to make room here for even an abstract of the President's address, but perhaps the following excerpt will attract more attention from mechanics and engineers than any other portion of this most able paper: "In thermodynamics, the first law, which asserts that heat and mechanical work can be transformed one into the other at a fixed rate, is well understood. The second law is now receiving the attention it merits. It is that the real value of heat as a source of mechanical power depends upon the temperature of the body in which it resides—the hotter the body in relation to its surroundings, the more available the heat. In order to see the relations which obtain between the first and the second law of thermodynamics it is only necessary for us to glance at the theory of the steam engine. Not many years ago calculations were plentiful, demonstrating the inefficiency of the steam engine on the basis of a comparison of the work actually got out the engine with the mechanical equivalent of the heat supplied to the boiler. Such calculations took into account only the first law of thermodynamics, which deals with the equivalents of heat and work, and has very little bearing upon the practical question of efficiency, which requires us to have regard also to the second law. According to that law, the fraction of the total energy which can be converted into work depends upon the relative temperatures of the boiler and condenser, and it is therefore manifest that, as the temperature of the boiler cannot be raised indefinitely, it is impossible to utilize all the energy which, according to the first law of thermodynamics, is resident in the coal. On a sounder view of the matter, the efficiency of the steam engine is found to be so high that there is no great margin remaining for improvement. The higher initial temperature possible in the gas engine opens out much wider possibilities, and many good judges look forward to a time when the steam engine will have to give way to its younger rival." Passing through a number of more technical matters, Lord Rayleigh went on to say: "It is remarkable how many of the playthings of our childhood give rise to questions of the deepest scientific interest. The top is or may be understood, but a complete comprehension of the kite and of the soap bubble would carry us far beyond our present stage of knowledge. In spite of the admirable investigations of Plateau, it still remains a mystery why soapy water stands almost alone among fluids as a material for bubbles."

On the "Kinetic Theory of Matter," Sir William Thomson, president of the mathematical and physical section, read an able paper, in which he said that "the now well-known kinetic theory of gases is a step so important in the way of explaining seemingly static properties of matter by motion that it is scarcely possible to help anticipating in idea the arrival at a complete theory of matter, in which all its properties will be seen to be merely attributes of motion. If we are to look for the origin of this idea, we must go back to Democritus, Epicurus, and Lucretius. We may then, I believe, without missing a step, skip 1,800 years."

The speaker then showed how Malebranche, early in the last century, gave expression to a distinct conception in support of the kinetic theory of matter.

Prof. Henry Enfield Roscoe, the president of the chemical section, made an address in which he reviewed the progress of the science between 1848 and 1884. The first date is that of the death of Berzelius. The second that of Dumas, the chemist. The differences between what the speaker called the Berzelian era and that with which the name of Dumas will be associated show themselves, he said, in many ways, but in none more markedly than by the distinct views entertained as to the nature of a chemical compound. According to the older notions, the properties of compounds are essentially governed by the qualitative nature of their constituent atoms, which were supposed to be so arranged as to form a binary system. Under the new ideas, on the other hand, it is mainly the number and arrangement of the atoms within the molecule which regulate the characteristics of the compound, which is to be looked on, not as built up of two constituent groups of atoms, but as forming one group. The general method now adopted in an experimental inquiry into the molecular arrangement or chemical constitution of a given compound is either to build up the structure from less complicated ones of known constitution or to resolve it into such component parts. "The discovery of anl line colors by Perkin, their elaboration by Hoffman, the synthesis of alizarin by Graebe and Liebermann, being the first vegetable coloring matter which has been artificially obtained, the artificial production of indigo by Baeyer, and, lastly, the preparation by Fischer of kairine—a febrifuge as potent as quinine—are some of the well-known recent triumphs of modern synthetical chemistry. And these triumphs, let us remember, have not been obtained by any such 'random haphazarding' as yielded results in Priestley's time. In the virgin soil of a century ago the ground only required to be scratched and the seed thrown in to yield a fruitful crop. Now the surface soil has long been exhausted, and the successful cultivator can only obtain results by a deep and thorough preparation, and by a systematic and scientific treatment of his material."

Prof. H. N. Mosely, M.A., F.R.S., Linacre Professor of Human and Comparative Anatomy in the University of Oxford, addressed the biological section of the Association, of which department he is president, on the phenomena of pelagic and deep-sea life. Knowledge of the subject, he said, was at present in most active progress, and was of the widest and deepest interest to the physiologist as well as the zoologist, and also claimed a share of attention from the botanist. No physiologist had as yet set forth comprehensively and dwelt upon the numerous difficulties which are encountered when the attempt was made to comprehend the mode in which the ordinary physiological processes of vertebrata and other animals are carried on under the peculiar physical conditions which exist at great depths.

One of the most interesting of the addresses was that of Sir Richard Temple, president of Section F, devoted to economic science and statistics. The title of his essay was "The General Statistics of the British Empire," and it embraced an enormous amount of information about the territory under the sway of Great Britain, its inhabitants, and the works of man as displayed in that vast theater of action. This paper was succeeded, however, by one even more complete from Mr. Edward Atkinson, of Boston, which treated in the broadest way the question, "What makes the Rate of Wages?" Unquestionably Mr. Atkinson has given to the consideration of such subjects an amount of consideration which renders his opinions, backed up as they are by a long array of statistics, worth the thoughtful attention of all who are endeavoring to better the social and economic condition of the world's wage workers.

After the close of the meeting, those who desire to attend the meeting of the American Association at Philadelphia will be provided with a special train to take them through from Montreal by daylight, without change of cars.

Successful Test of a Safety Track and Switch.

Within the past two years the New York, New Haven, and Hartford Railroad Company have been testing an improved automatic safety switch and signal, with the intention of protecting their many draw bridges upon the line of their road, and thereby avoid the stoppage of trains.

In view of the accident at South Norwalk some years ago, when a train ran off an open draw and several persons were killed, it was found necessary to devise a mechanism whereby the safety of a train would not be imperiled should the engineer neglect to notice the danger signals.

An automatic arrangement has been attached to the draw bridges at Westport and Cos Cob, Conn., which works substantially as follows: Before the draw bridge tender can open the draw, he is obliged, by means of suitable levers arranged in a cabin at the draw, first to set two danger signals, on each side of the bridge and distant therefrom respectively 300 and 1,200 feet, and then by means of iron rods and levers to move a switch at a point 200 feet from the bridge, from the main track to a siding which terminates in a sand bank; the lock of the draw is then automatically released, allowing the same to be opened.

Unexpectedly to the company, the apparatus received a very efficient test on the night of the 31st July, at the Cos Cob bridge, near Greenwich, Conn.

A vessel was passing through the draw at the time, the danger signals and safety switches had been set as was required, when suddenly an accommodation train from New York filled with passengers dashed along by the danger signals, passing on to the safety switch, ran over the length of the siding, coming to a standstill on the sand bank at the end of the same; not a passenger was injured. The engineer had not observed the danger signals, and had it not been for the safety switch and side track, the train would inevitably have plunged into the river.

New Intensifier for Gelatine Plates.

A formula for an intensifier which has the merit of giving to a negative or transparency a rich, dark-brown wine color has lately been given as follows:

No. 1.

Water	6 ounces.
Of a saturated solution of bichloride of mercury	1 ounce.

No. 2.

Water	6 ounces.
Sulphite of soda (crystals)	120 grains.

The negative is laid in No 1 for a length of time according to the amount of intensity desired. The solution whitens the film; if a small amount of intensification is desired, the plate is left just long enough to bleach or whiten the surface of the film; after careful washing it is next placed in a bath of No. 2, and rapidly assumes a dark, rich-brown color. If No. 2 works slow, more sulphite soda should be added. For line work negatives this intensifier is highly recommended.