orchards during and immediately after spraying, especially as no animal would eat the sprayed grass exclusively. To test this fully, I sprayed a large tree over some bright tender grass and clover. I then cut the clover carefully, close to the ground, and fed it all to my horse. It was all eaten up in an hour or two, and the horse showed no signs of any injury. This mixture, remember, was of double the proper strength, was applied very thoroughly, and all the grass fed to and eaten by the horse. This experiment was repeated, with the same result. I next secured three sheep. These were kept till hungry, then put into a pen about a tree under which was rich, juicy June-grass and clover. The sheep soon ate the grass, yet showed no signs of any injury. This experiment was repeated twice, with the same result. It seems to me that these experiments are crucial, and settle the matter fully. The analyses show that there is no danger: the experiments confirm the conclusion.

Thus we have it demonstrated that the arsenites are effective against the codling-moth; that in their use there is no danger of poisoning the fruit, and, when used properly, no danger to the foliage, nor to stock that may be pastured in the orchard.

PLANT-LIFE OF ARABIA FELIX.

PROFESSOR SCHWEINFURTH, at a recent meeting of the Berlin Geographical Society, spoke of his journey to Arabia Felix, undertaken from November, 1888, to March, 1889, with the object of making botanico-geographical studies. Stimulated by a journey of the French botanist, A. Deflers, in the year 1888, Schweinfurth determined to make one of the chief objects of this journey to Yemen the obtaining of authentic specimens of a large number of the species of plants described by the Swede, Peter Forskal, the botanist of the Niebuhr expedition (1761), who, when barely twenty-seven years old, fell a victim to the climate after much ardent activity in exploration. For what reason the scientific world, considering the complete opening-up of this ancient land of civilization, has deferred so long the exploration of the country, it is difficult to understand; since Yemen, not only since the recent taking-possession of the country by the Turks, but for a long period, has been distinguished, above all other parts of South Arabia, for the safety of travel and the well-tested courtesy of the inhabitants towards Europeans. Several plants, useful to man and cultivated by him, have, through the medium of South Arabia, found their way to the civilized countries of the north. Some, like coffee, appear to have been converted here for the first time from their natural state into the service of man. In ancient times there were in the first place various fragrant substances exported from here. On that account the country was named, from the oldest dynasties of the Pharaohs down to the later Roman period, the holy land, the land of the gods. The Punt country of the old Egyptians is surely not only to be looked for in Africa, but denotes in the wider sense the territory on both shores of the southern part of the Red Sea. The designations "stair" mountain and "step" mountain, both in the old hieroglyphics as well as in Ptolemy and in the works of Arabian geographers, Yakut and Hamdany, refer especially to the terraced cultivated slopes of South Arabia, constructed with such a large expenditure of labor, while they possess no meaning if applied to the Somali country. The ancient Egyptians took special care of certain trees, which were dedicated to particular deities. Thus the sycamore-tree was consecrated to Hathor. From the oldest tombs found in the Pyramids, and belonging to the fourth dynasty, down to the latest lists of offerings of the Ptolemaic-Roman epoch, the fruit of the persea (*Mimusops schimperi*), the "aschd," appears as a continually recurring gift to the gods and to the departed. The tree was regarded as specially sacred, and was dedicated to the greatest god, Rê, the sun, and on numerous occasions the leaves and fruit of both trees have been brought from the tombs to the light of day. The foreign origin of the tree called *Persea* in the Grecian authors, not to be confounded with the *Persea gratissima* of to-day, as coming from Ethiopia, by which term Abyssinia as well as South Arabia may be understood, is attested by Strabo and Diodorus, and confirmed by the present widespread existence of wild-growing species. For several centuries the tree has entirely disappeared from Egypt. On the other hand, the sycamore, although only in a cultivated state, is still to be found in Egypt and certain parts of Syria. Schweinfurth has now discovered in Yemen in numerous places fig-trees, in the case of which he has proved botanically that these trees, called in the mountainous country *chanes*, and in the lowlands *burra*, are completely identical with the Egyptian sycamore. At the same time the traveller found, in the lowest mountain regions of Yemen, the *Persea* of the ancients growing wild; and it was there designated with the old Arabic name *lebbach*, which was known to the Arabian geographers of the middle ages. The *Mimusops schimperi* was formerly only found in North Abyssinia. With the disappearance of the tree in Egypt, for the protection of which the Emperor Arcadius made a special law, which is still preserved, there disappeared in later Egypt also the proper meaning of the name *lebbach;* and at the commencement of the last century the term was transferred to a species of acacia (*Albizia zebbell*) introduced from India, which is to-day the most widely spread tree in Egypt. In connection with the traditions inscribed on the ancient monuments, the fact that in Yemen to-day there are still species of trees growing wild, which several thousands of years ago and during a period of three thousand years were held in Egypt to be sacred as symbols of divine worship, throws important light upon the old relations subsisting between the two countries.

HEALTH MATTERS.

THE INHALATION OF DUST. — Dr. Kunze, in his inaugural thesis for the M.D. degree of the University of Kiel, publishes as a contribution to the diseases caused by the inhalation of dust a series of examinations of lungs so affected. In all these, as stated in a recent number of the London *Lancet*, dust was found microscopically; and, after chemical tests in the various anatomical and histological parts of the lungs and in the interior of the lymphatic vessels, numerous leucocytes were found covered with the dust. Being arrested in its progress, it causes inflammation, producing hyperplasia of connective tissue, especially where a dense network of lymphatic vessels exists. Dr. Kunze also proved that the degree of alteration in so-called "dust lungs" depends not merely on the quantity of the dust inhaled, but also on its greater or less morphological power of injuring the tissue. He concludes from his experiments that even the greatest alterations in these lungs — such as nodes, indurations, and vomicæ — are mainly produced by the inhaled dust, and that tuberculosis is only an occasional coincidence. The least serious alterations in the lungs resulted from the inhalation of lamp-black, the particles of which are very fine and little injurious; the most serious, from the dust inhaled by earthenware manufacturers and stone-masons. The lungs of a locksmith showed only a moderate hyperplasia of connective tissue, the dust consisting partly of the finest particles of iron. In a worker in oxides of iron the lungs were found full of small granules, and the morbid changes in the tissues were very considerable. The lungs of gold-miners were generally indurated and atrophied: the dust in these cases is exceedingly fine. Sand produced numerous circumscribed hard nodules and thick indurations. In cloth-manufacturers, the lungs, in spite of their contact with an enormous quantity of organic dust, presented but few indurations. In the lungs of two stone-masons, induration and tuberculous disintegration were observed: all the other lungs were entirely free from tubercles of any kind, — an observation which was verified by the absence of tubercle bacilli in the muco-pus in the vomicæ.

CONGRESS FOR TUBERCULOSIS. — The second congress for tuberculosis will be held in Paris during the latter part of July, 1890. Professor Villemin will act as president. The following questions are to be discussed: 1. The identity of human and bovine tuberculosis, also that of other animals; 2. The bacteriological and morbid associations of tuberculosis; 3. The isolation of tuberculous subjects; 4. The agents capable of destroying Koch's tubercle bacillus, with a view to the prophylaxis and therapeusis of the disease in man.

MEDICINE IN JAPAN. — In Japan there are thirty-one schools of medicine, one of dentistry, and two of veterinary surgery. The University of Tokio (the Imperial University) has over twelve hun-

dred students, and an average of one hundred medical students graduate yearly. In Tokio alone there are numerous active medical societies and over twenty hospitals.

RUSSIAN STUDY OF INFECTIOUS DISEASES. — An institute has been founded in St. Petersburg for the experimental study of infectious diseases and for prophylactic inoculations. The institute is to be under the charge of Professor B. Anrep.

FRENCH AND GERMAN TOBACCO. — The *Progrès Medical*, July 13, 1889, gives a brief account of the international congress to protest against the abuse of tobacco, which was recently held in Paris. M. Ortolan made the interesting statement that the proportion of nicotine in tobacco is less when the stalks grow close together, and when the leaves are numerous and placed very low upon the trunk. This is the reason, he said, why the German, who smokes more than the Frenchman, poisons himself less. In the former country tobacco-growing is free, whereas in France it is regulated by the government, and the number of leaves to the stalk is limited. French tobacco, he said, contains as much as six per cent of nicotine.

JELLY-FISH STING. — Bathers who have encountered the long tentacles of a medusa will be pleased to know, says *Medical News*, that the "sting," or erythema, may be speedily relieved by the application of water rendered alkaline by common washing-soda, in the proportion of an ounce of soda to about two quarts of water.

THE DANGERS OF CARBOLIC ACID. — The following letter of Dr. Th. Billroth of Vienna has been published in the *Lancet*: "I have lately seen four cases in which fingers which had suffered a most insignificant injury became gangrenous through the uncalled-for application of carbolic acid. Carbolic acid is now much less used in surgery than formerly. We have only gradually become acquainted with its dangers. The acid may not only cause inflammation and gangrene, but also blood-poisoning, and so may even prove fatal. It is useful only in the hands of a skilful surgeon, and ought never to be used without his advice."

VENTILATION IN ICELAND. — The extreme cold of the winter in Iceland reduces the system of domestic ventilation in that country to very primitive principles. A traveller there was so choked one night by the close atmosphere of the air-tight little chamber in which he slept, with all the male members of the family, as to be compelled to wake his host, who sprang out of bed at the call, pulled a cork from a knot-hole in the wall for a few minutes, and then, replacing the cork with a shiver, returned to bed.

LEPROSY IN HAWAII. — It is estimated that there is one leper to every forty of the inhabitants of the Sandwich Islands. Speaking of leprosy, *Medical News* states that a Chinese leper was recently discovered in the Sacramento jail. He had been sent there for refusing to pay a poll-tax.

FREEDOM OF AIR FROM GERMS. — Dr. Le Fort says that microbes are never conveyed in the air, but only by contact with the fingers, instruments, etc.

CHOLERA. — Two cases of cholera, one of which terminated fatally, are reported to have occurred in Hungary. Cholera has appeared also in Mesopotamia, as shown by the following despatch, published in the Marine Hospital Service *Bulletin* under date Sept. 13: "Cholera, since July 27, made its entry into Mesopotamia in as mysterious a manner as it made its appearance into Egypt in 1883. It is certain that it penetrated from Bombay *via* Bassora; it could not as yet be determined how, perhaps (as in Egypt) through Arabian stokers (firemen), who are employed on the English steamers of the Bassora-Bombay line, and who, upon their arrival at Bassora, go to their homes. At first cholera appeared at Schatra (3,000 inhabitants), two and a half days' journey from Bassora, at the Schatel-Hay Canal, which connects the Tigris with the Euphrates River. In a few days, from July 27 to Aug. 6, 308 persons died. On the 1st of August it appeared at Naszrie (8,000 inhabitants), southerly from Shatra, near the embouchure of the Schatel-Hay into the Euphrates, — a city which was founded in 1872 by Natir Pacha, the Montefik sheik. From the 1st to the 9th of August, 293 deaths occurred, on the 8th of August so many as 85. The houses are situated upon the flat marsh-land, and are only reed huts. The inhabitants carry on the culture of rice and some cattle-raising. It finally made its appearance at Bassora on Aug. 6, and at first an Arabian girl died who had come there ten days before from Filie in Persia. On Aug. 9, 15 deaths occurred there. The reports of Gazala, the sanitary physician, do not allow any doubt to arise as to the diagnosis."

MENTAL SCIENCE.

Experiments upon Association of Ideas.

IN *Mind*, No. 54 ("Mental Association investigated by Experiment," by J. McK. Cattell and Sophie Bryant, D.Sc.), is printed an account of experiments upon certain very usual mental products, which commands interest not so much for the intrinsic value of the results obtained as for the suggestiveness of the inquiry that it opens up. An association as ordinarily studied begins with the perception of a written or spoken word, includes the calling-up of another idea by the first, and ends with the expression of the associated word by mouth or pen. The characteristic element in the process is the central one, while the perception and the expression factors have a somewhat mechanical *rôle* to play, and must be eliminated in the study of the association process *per se*.

The two aspects of association studied in the present research are (1) the time taken up in mental association, and (2) the nature of the association. The difficulty in studying the former is that the time taken up by perception and expression is not absolutely separable from the association time, the two processes in part overlapping. In experiments specially designed to study the perception and expression times, it was found that it takes about half a second to see and name a word, so that approximately the difference between the entire time and half a second will be the association time. The same 20 nouns were used with about 500 observers, and 6 observers answered to groups of about 250 words. Former experiments in which it was possible to eliminate the mechanical elements had shown that it took Dr. Cattell, on the average, .380 of a second to make an association with a concrete noun, and .508 of a second with an abstract noun; the time for an association with a verb being intermediate, .465 of a second. The abstractness of the word renders the association process difficult, this being especially evident in extreme cases. Thus, to make the association *deliverance-hope* required 1.453 seconds; *civilization-wilderness*, 1.064 seconds; while the quickest associations were *good-bad* (.111 of a second), *father-mother* (.132 of a second), and the like. Individual variation regarding the time of association is of course large, and the stage of mental development is an equally important consideration. It was found that the boys in an upper class of a German gymnasium took considerably less time to respond with associations to a given series of words than the boys in a lower class.

A somewhat different method of investigation consisted in giving simply the first word, and asking the subject to write as many suggested words as possible within 20 seconds. From this the average association time (including the very long writing time) can be calculated. This was tried with four forms of a London girls' school, with a Dublin girls' school, with some students of Bryn Mawr College, and with some London and Irish graduates. A very distinct shortening of the time accompanies the advance in form. When the average age of the pupils was 12.7 years, the average time for concrete nouns was 6.9 seconds; at 14.8 years it was 4.76 seconds; at 16.3 years, 4.26 seconds; at 17.8 years, 3.7 seconds. The corresponding time for the Bryn Mawr collegians was 3.51 seconds. The associations with abstract words require constantly more time than with concrete words, but this difference diminishes as the mental development progresses. Furthermore, the last class-rank bears a relation to rapidity of association, the highest pupils showing a quicker time, though this relation is only a general one. Some words more readily call up a series of words than others. Fatigue and a variety of factors also enter to influence the association times, but their relative worth is not affected by these disturbances.

Turning to the nature of the association, we are at once struck by the frequency with which a word suggests the same word to the minds of different persons. Four hundred and sixty-five per-