element is unnecessary, because there is no voluntary reflection involved in attaining this idea. The second class includes the fusion of images in different objects, still without the aid of words, and is represented in the common abstraction. This is a much higher process, and many peoples have stood still at the early stages of it. The Fuegians have no abstract terms; the Indians have words for 'red oak,' for 'white oak,' but not for 'oak' in general; the Tasmanians have words for different kinds of trees, but not for 'tree.' In all these processes there is a motor element in the word, and perhaps in the image too. Finally, as the image becomes more and more abstract, the word becomes more and more fundamental. That the word contains a prominent motor element (varying, however, in its strength in different persons) is generally accepted, and is shown by the fact that this element in language can be lost while the rest remains unlost.

We are thus led to the conclusion that thought without motion is impossible; and, though we cannot have the opportunity of demonstrating this absolutely, we can make it extremely probable. Severe activity is incompatible with intense thought. To direct one's attention is work, and the less natural interest in the topic the more fatiguing the strain. It is not a purely mental process, but is connected with nerve-activity and such movements. Monoideism is work, destruction is rest.

Finally the hints as to the action of attention to be derived from experimental study should be noted. In re-acting to a stimulus, the time is shortened when the attention is fixed, and is lengthened when the attention is wandering. So, too, the more cultured classes can re-act more quickly than the ignorant, because their power of voluntary attention is drilled. If the physical state prevents sharp attention, the time is lengthened. A headache lengthened a re-action-time from .133 to .171 of a second, and severe fatigue to .183 of a second. In various stages of paralysis the time lengthened to .166, .281, and .755 of a second; while in hypnotism, when there is an extraordinary concentration on one perception, the time was shortened from .328 to .193 of a second. Again: the most influential factor in the re-action-time is the expectedness of the impression. If the sensation is preceded by a signal announcing its approach, the time is much shortened. According as the nature, intensity, and time of the stimulus is known, the time is more and more shortened. The unexpected delays the re-action. Again: Wundt has shown that when two impressions — say, the ring of a bell and the movement of an indicator — are simultaneous, the one that is attended to gets first perceived. The adjustment accommodation of the attention in all these cases is again a motor act.

SCARLET-FEVER REPORT. — I.

THE success which has followed from the collective investigation into the subject of distillery-milk and its effects on the lower animals and man when used as food, which was made by *Science* in June, has induced this journal to undertake other inquiries into similar matters which affect the public health. Correspondence has been opened with a number of prominent sanitarians of the United States, and as a result scarlet-fever has been selected as the next subject for inquiry. The following letter has been prepared, and forwarded to leading sanitarians and physicians, and others: —

The prevalence of scarlet-fever in all parts of the civilized world, and the great mortality therefrom, amounting in England alone during five years to 88,273 deaths, have induced *Science* to institute an inquiry into the reasons for such a condition of things, — whether it is a fact that this disease is not amenable to control by sanitation; or whether sanitarians have not suggested any practical method by which it may be controlled; or whether parents, teachers, health authorities, and others neglect to carry out the recommendations which sanitary science has made. With the object of helping to determine these questions, will you kindly answer the following inquiries:

1. Do you believe that scarlet-fever ever arises, at the present time, *de novo*, as distinct from a pre-existing case? If so, on what grounds do you base that belief?

2. Is there any doubt in your mind that scarlet-fever is a communicable disease, and, if so, what reasons have you for that doubt?

3. If you believe it to be communicable, can you give any instances which have come under your own *personal* observation, tending to prove its communicability? If so, please give them in detail.

4. Have you any information touching the communication of bovine scarlet-fever to man, either by contagion or the milk of the affected animal?

5. When does a patient who has had scarlet-fever cease to communicate it to others?

6. Can you give any instances which have come under your own *personal* observation in which clothing, toys, books, or other articles have communicated the disease? If so, please give them in detail.

7. How long have you *personally* known such articles to retain the infection?

8. Should boards of health require reports of cases of scarlet-fever to be made to them, and, if so, by whom and why?

9. What is the duty of boards of health if such reports are received?

10. Is there any plan which, if put into execution, would, in your judgment, prevent the spread of scarlet-fever?

11. If so, can you give instances in which it has practically done so?

12. Do you believe that any thing can be done, by the use of remedies or otherwise, to prevent well persons from contracting scarlet-fever when they are exposed to it?

13. Can you give any *evidence* not under your own personal observation, but sufficiently authenticated by competent authorities, printed or otherwise, touching any of the questions propounded in this circular?

To these inquiries a large number of answers have been received, which we now propose to lay before our readers: —

[WILLIAM K. NEWTON, M.D., Paterson, N.J., State dairy commissioner.]

Below please find answers to your circular relating to scarlet-fever:

1. I have often seen isolated cases of this disease beginning at a time when no other case existed in the city. Many times I have seen a single case begin without any probability of an exposure to another case, but I do not think that we are justified in accepting the theory that the disease may arise *de novo* because of our inability to find the original case. But there is much to lead us to study this side of the question, for filth may be a possible cause.

2. It is no doubt communicable.

3. It is communicable, and scores of instances might be mentioned to substantiate this statement. Cases where children have been exposed at school for a few minutes to one sick with the disease have come under my notice, and, where they have not had the disease before, they have taken the disease in due time. It is a common occurrence for children exposed to the sick to contract this disease.

4. No personal information. The London *Lancet* during the past two years has contained many articles on this subject.

5. As long as there is any roughness of the skin.

6. Have known of many instances where woollen clothing has been the means of carrying the disease.

7. Three weeks.

8. Yes, if the proper officers are prepared and authorized to enforce strict separation and quarantine. If reports are required, and on receipt by the authorities are filed, or only tabulated, and no repressive measures employed, no good is done; and the reports should not be required, for they only go to swell the statistics without benefit. The attending physician is the proper person to notify the authorities, and for this work he should be compensated. Reports from the householder or the family are not reliable, and are not promptly made. As was said, these reports are for the purpose of enabling the health authorities to restrict the spread of the disease, and, if notification is required, restrictive measures should be followed up.

9. The reports should first be recorded, and the location of the case marked on a map of the city kept for that purpose, the latter entry being a record of location to enable us to ascertain if locality

has any thing to do with the disease. Next the proper officer should be sent to the house to instruct the family in methods of disinfection, and to note the condition of the house. He should leave with the family a circular, issued by the board of health, giving an account of the disease, its methods of spreading, and its dangers, also brief directions for disinfection. On the recovery of the patient, or in case of death, the premises should be disinfected by an officer of the board. People from infected houses must be excluded from school, church, factories, etc., and a strict quarantine maintained until the premises shall have been disinfected. In case of death, the body should be interred as speedily as possible and no public funeral allowed. No person should be allowed to enter the house except the regular attendants.

10. If the above plan is rigidly carried out, it is possible to check the spread of the disease; but at present it is not possible to strictly quarantine or isolate cases of this disease, because many think it a mild one and of little consequence. Again, many cases are so mild that the sick person is not confined to the bed or even the house, and hence mingle with the well, and these mild cases are often not recognized.

11. I know of no instance where the spread of scarlet-fever has been certainly and completely stopped by restrictive measures; but could we enforce rules as rigidly as is done in epidemics of small-pox or cholera, where the public is prepared for harsh methods, it is probable that the disease might be stamped out for a time.

12. I know of none.

[SAMUEL W. ABBOTT, M.D., Boston, Mass., secretary State Board of Health of Massachusetts.]

In answer to your circular relative to scarlet-fever, I have the honor to reply as follows; my reply being based upon an active country-practice of twenty years, and also upon five years' experience as the health-officer, and secretary of this board, during which time I have had opportunity to observe a considerable number of epidemics of scarlet-fever of varying extent and severity.

1 and 2. No.

3. An instance under my observation is the following: A health-officer visited a public institution for the purpose of giving advice as to preventive measures. While there he saw several children ill with scarlet-fever, in various stages of the disease, and examined them at the bedside. He then returned to his home, a hundred miles distant. On his way home, and before returning to his family, he took the precaution to take a thorough bath, and, on reaching home, sent his clothing to a cleansing establishment. About eight days afterward, three of his children were taken ill with scarlet-fever, one of whom died on the fifth day afterward. There were no other cases of scarlet-fever in the town at that time.

4. A limited outbreak occurred last spring in the town of Wellesley. Four children were taken ill in two families who took milk from one man who had two cows. There were no other cases in the town at that time. One of these cows had an eruption on the udder, which, on examination by a competent veterinary surgeon, did not appear to have the characteristics described by recent English reports. I do not regard this as a conclusive case.

5. Not until after desquamation has been completed, and all germs of the disease originating from the patient have been destroyed.

6. I have no doubt that such is the case, but have no positive evidence on this point.

8. Yes, by the attending physician, who is the only competent authority to judge of the character of the disease. The law of this State makes it incumbent on both physician and householder to report, but reports from the latter are rare.

9. To isolate the sick, and see that proper measures are taken for the continuance of such isolation, and of disinfection upon recovery; and in case of death the funeral should be private.

10. Nothing short of complete isolation of the sick, and absolute destruction of all germs of the disease.

11. The following statistics are suggestive. By circulars, reports of boards of health, public lectures, and by every possible means, the contagiousness of scarlet-fever has been taught, and the community has been led to see the dangerous character of the disease, and its destructiveness as compared with other diseases, until public opinion will tolerate much more decisive measures than were possible twenty years since. The following table (from the 'Massachusetts Registration Report for 1886') shows that the disease has not been so destructive in the past fifteen years (1872–86) as it was in the previous fifteen years (1857–71) in this State: —

Mortality from Scarlet-Fever, 1857-86.

YEARS.	Deaths.	Percentage of Deaths to Deaths from All Causes.	Death-Rates per 10-000 Living.	YEARS.	Deaths.	Percentage of Deaths to Deaths from All Causes.	Death-Rates per 10,-000 Living.
1857 . .	2,013	9.36	17.2	1872 . .	1,377	3.93	8.9
1858 . .	1,051	4.99	8.8	1873 . .	1,472	4.34	9.4
1859 . .	1,038	4.88	8.6	1874 . .	1,382	4.33	8.6
1860 . .	916	3.92	7.4	1875 . .	1,684	4.81	10.2
1861 . .	1,137	4.66	9.2	1876 . .	1,222	3.79	7.4
1862 . .	1,261	5.42	10.1	1877 . .	467	1.53	2.8
1863 . .	1,399	5.01	11.1	1878 . .	404	1.33	2.4
1864 . .	1,503	5.21	11.9	1879 . .	850	2.63	4.9
1865 . .	807	3.06	6.4	1880 . .	574	1.63	.2
1866 . .	385	1.58	2.9	1881 . .	397	1.09	2 2
1867 . .	828	3.63	6.2	1882 . .	318	.87	1.7
1868 . .	1,369	5.35	9.1	1883 . .	575	1.52	3.5
1869 . .	1,405	5.39	9.9	1884 . .	627	1.69	3.3
1870 . .	683	2.49	4.7	1885 . .	587	1.54	3.0
1871 . .	867	3.10	5.8	1886 . .	331	.89	1.7
Average 15 yrs. (1857–71)		4.51	8.5	Average 15 yrs. (1872–86)		1.97	3.9

Undoubtedly several extensive epidemics might upset these statistics. I think, however, that the length of time included (30 years), and the size of the population (1,231,067 in 1860, and 1,942,141 in 1885), may be taken as conclusive that something has modified the progress of the disease, the death-rate in the last fifteen years being less than one-half as large as that of the fifteen years previous (1857–71). If the period of ten years 1857–66 be compared with the last ten years (1877–86), the result is still more striking, the death-rate of the latter period from scarlet-fever being less than one-third as great as that of the former period.

12. By remedies. No.

13. I beg leave to mention one or two popular errors in this connection. There is a singular notion that physicians' families are comparatively exempt from infectious diseases. On the contrary, I can call to mind at least a dozen families of country physicians in active practice, within five miles of my present home, which have been invaded by this destructive disease. Another error is the notion that a dead body is more dangerous than a living one. There is no evidence, so far as I can learn, in support of such a notion. One living, breathing body, sick with infectious disease, must necessarily produce more infectious material than a dead one.

[R. B. S. HARGIS, M.D., Pensacola, Fla.]

In relation to the questions concerning scarlet-fever stated in your circular, I proceed at once to answer them in order: —

1. I have seen scarlet-fever on two occasions, in an isolated house, — no other cases in the city nor in the neighboring places, — the source of which could not be traced to any focus of infection outside the walls of the dwellings in which the cases existed. I have also seen measles, a congener of scarlet-fever, undoubtedly a contagious disease, spring up spontaneously, and spread from a single isolated place all over the city, thus apparently arising *de novo*. Upon careful and anxious inquiry in regard to the above-mentioned instances of spontaneous development of scarlet-fever and measles in isolated places, I was informed that none of the parties in those houses had had any correspondence, by letter or otherwise, or purchased or received any fabrics, or indeed articles of any kind, from persons at a distance anywhere. All infectious and contagious diseases are associated, as a rule, with cutaneous eruptions or glandular

affections, and capable of propagation by inoculation. Whooping-cough may be an exception so far as eruptions and glandular affections are concerned.

2. I have not the least doubt of the communicability of scarlet-fever. I know that it can be propagated by *fomites*. Diseases that can be communicated and transmitted by *fomites* are absolutely contagious: this is self-evident, and cannot be disputed with any show of reason.

3. I know a remarkable instance of the communicability of scarlet-fever by things. It occurred in my own family, living more than two thousand yards from any infected place. The subjects of it got the disease from the clothes of a person who had visited a house in which there were two or more cases.

4. I have no information touching bovine virus.

5. I have known children who had had scarlet-fever, a week after the process of desquamation had been completed, and after antiseptic baths, and their clothes and house environments had been subjected to a disinfecting process, to return to school, and mingle freely with other pupils without communicating the disease to any one. Some writers in the medical journals express the opinion that from four to six weeks should be allowed to elapse before those who have recently had scarlet-fever be permitted to have free intercourse.

6. This question is answered in Paragraphs 1 and 3.

7. I have no experience with regard to the length of time the infection of scarlet-fever may be retained in any articles, but authors will be referred to when Question 14 is under consideration.

8. Boards of health should be empowered by legislative enactments in every State to enforce physicians, and the laity also, — every citizen who may know of a case, or even a 'suspicious case,' anywhere in his vicinity, or indeed in any place from which the disease might be introduced, — to report without delay to the proper authorities.

9. The duty of boards of health and others in authority is to act promptly on receipt of the report of the first case of scarlet-fever, and enforce isolation and disinfection rigorously; and it should be made incumbent on the attending physician to change his clothes, and bathe, etc., before visiting other houses not infected. I have known the morbific principle, both of small-pox and yellow-fever, to be carried in men's beards, and communicated to their wives and children. Indeed, the *materies morbi*, or germs of all contagious diseases, can be transmitted from place to place by any thing capable of absorbing, or holding adherent to it, any substance, dead or living, whether in a solid, fluid, or gaseous form.

10. Besides what I have already indicated in answer to Question 9, I know of no other plan of preventing the spread of scarlet-fever except inoculation and the administration of small doses of belladonna, which should be considered as only a small part of the plan already indicated.

12. As just stated in answer to Question 9, I should state that I gave belladonna to three children for whooping-cough, living in the same house, situated in the very heart of a district infected with scarlet-fever, which was epidemic, and whose parents communicated freely with persons who had the disease, and every one of them escaped.

13. Touching the questions stated in your circular, I can give no further evidence of importance as the result of my own personal observations, but refer to the following authorities, which I have selected from many others in my library: viz., Watson's 'Practice of Medicine' (American edition, edited by Dr. Francis Condie), p. 1180; Ziemssen's 'Cyclopædia of the Practice of Medicine,' vol. ii. pp. 161 *et seq.*; Aitken's 'Science and Practice of Medicine,' 6th edition, vol. i. p. 480.

Scarlet-fever, in my opinion, is certainly amenable to control by proper sanitary measures under ordinary circumstances; but if a case occurs in a town or city where there exists a certain condition of the atmosphere, or certain meteorological states of the air (of which we know very little, and which has been significantly termed 'epidemic constitution of the air'), spreading diseases will extend *per se* through it as a medium. Yellow-fever does this, and travels about forty feet a day, and thus, by the concurrent existence of a line of personal communication, spreads over a city and its suburbs, and even beyond. Small-pox has been known to spread from certain centres (hospitals, for example) for over one thousand yards. It is shown lately (see *The American Journal of the Medical Sciences* for July, 1887, p. 300) by the 'Report of the Local Government Board of England' that from small-pox hospitals the *materies morbi* of *variola* will travel *per se* through the air to the extent of at least half a mile.

I would refer you to the *Medical News*, Nov. 26, 1887, p. 627, for a short but excellent paper on the contagion of scarlet-fever. From its tenor the contagious nature of scarlet-fever is admitted, but it is assumed that it is caused by a germ or living organism which has not been shown to exist. I am one of a small minority among the medical profession who cannot accept the germ theory of disease. Germs of microscopical organisms may, nay, no doubt do, carry contagion, but have no etiological relations as to the primary cause, or *causa causans*, of contagious diseases; and I say this in spite of my familiarity with the literature of the subject, — the latest experiments of Pasteur, Koch-Klein, Edington, Jamieson, Dale, Unger, and others are right now in arm's reach of me, and have been carefully read by me, several for the third time, — I cannot yet accept the germ theory of disease.

[G. C. ASHMAN, M.D., Cleveland, O., health-officer.]

1. I do not. But I think it possible, and even probable, that some of the lower animals have scarlatina, or a disease of which scarlatina in man is a modification.

2. None whatever.

3. (*a*) An instance where clothing worn by children having the disease in January was brought into another family the following April, cases occurring within ten days thereafter; (*b*) an instance of school-books used in a family suffering from scarlatina in June, upon being opened and used by other children the following September, appeared to cause the disease; (*c*) a large number of instances where physicians and others coming in contact with cases have appeared to carry a germ of disease to their own or other families.

4. None.

5. I do not know. My observation leads me to the conclusion that the disease is communicable at any stage after fever begins, and at least until desquamation is completed; and this last stage is often very prolonged.

6. As in No. 3.

7. Three to four months.

8. Most certainly. By the physician or other person making diagnosis. For the prevention of extension, thereby saving life and health. As it is a disease of childhood chiefly, prompt notification of school authorities enables them to exclude infected or infectious children from schools. A placard upon the infected house notifies all who are about to enter of the nature of danger to which they are exposed. It educates the people, and favors isolation.

9. To notify the public of danger, and to render the infected such assistance as may be necessary; to have, if possible, a hospital to which all cases not otherwise isolated should be removed promptly; to give information as to the nature and prevention of the disease.

10. Yes, prompt and complete isolation of every case.

11. An instance of a child in a family of four, none of whom had had the disease; the child affected at once isolated in the same house; the skin in every part washed twice a day with a solution of mercuric chloride (1 to 1,000), and all secretions and excretions treated by the same solution; the isolation maintained for nine weeks; no communication in any way.

12. Yes, in a measure. I believe there is in every individual a natural resistance to diseases, varying in individuals and the same individual at different times, and in respect to certain diseases. This natural resistance is at its best when all bodily functions are best performed.

13. Text-books can do it better.

[*To be continued.*]

BOOK-REVIEWS.

Higher Grounds. Hints toward settling the Labor Troubles. By AUGUSTUS JACOBSON. Chicago, McClurg & Co. 16°. $1.

THIS is a small book, as books go nowadays, for it may easily be read through at a sitting. But it demands comment out of