

Chicago, had a bright man who was decidedly defective in his color sense and Dr. Gardner told him that it was incurable. The man said he would cure himself and in a year's time came back and Dr. Gardner could not catch him. At the end of the test, however, the man happened to pick up a piece of glass from the table, saying, "Why, doctor, where did you get that beautiful green glass?" The glass was a ruby red, but a different shade of red from that with which he had been training.

DR. O. P. FRANK, Chicago, said that the formula given by Dr. Black does not take into account that the light varies according to the square of the distance. The focal length of the lens, the thickness of the glass and the source and kind of light must also be taken into account. Dr. Frank asked the source of the value of 105.4 per cent. He quoted Dr. Black as saying that the intensity of light loses 10 per cent. by reflection. Dr. Frank thought absorption was meant. The angle of incidence, too, must be taken into account, for the absorption varies according to the angle of incidence.

DR. W. R. PARKER, Detroit, reported that he had had patients who passed perfect examinations with the worsted who afterward failed with the lantern. One man had a miniature set of skeins with which he had spent hours practicing. He had so trained himself that he could tell all of the colors, and it was only by the comparative tests, two shades of the same color, that his color blindness could be detected.

DR. NELSON M. BLACK, Milwaukee, said that a change of shades can be had by slipping into the lantern any of the various shades of glass used in railroad work. This instrument is only in the experimental stage and the working out of the formula may be far from being perfect. It has been proven photometrically that 10 to 15 per cent. is lost by reflection and an additional amount by absorption. This can be seen when riding in a car at night and seeing the reflection of the whole interior of the car.

AN ANALYSIS OF FORTY CASES OF MENINGITIS IN INFANCY.*

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These cases, equally divided between the tubercular and cerebrospinal forms, were all patients in the wards of the Infants' Hospital. The diagnosis was made in every case by autopsy or lumbar puncture. A marked predominance of mononuclear cells in the spinal fluid was considered diagnostic of the tubercular form, and of polynuclear cells of the cerebrospinal form. In all but three of the cerebrospinal cases the meningococcus was also found. This study was undertaken to determine, if possible, something as to the symptomatology of meningitis in infancy and as to the differential diagnosis between tubercular and cerebrospinal meningitis at this age.

GENERAL SUMMARY OF CASES.

Onset.—The onset was sudden in four of the tubercular cases, the first symptom being convulsions in three and coma in one. In the other tubercular cases the onset was slow. The onset was also sudden in four of the cerebrospinal cases, the first symptom being convulsions in three and high fever and vomiting in one. The onset was slow in seven of the cerebrospinal cases, definite symptoms pointing to the brain not developing until after from four days to two weeks. There was some vomiting in four, but no more than would be expected in any slight disturbance at this age. All had

more or less fever, while in two the symptoms were those of a "cold." In the other cerebrospinal cases there were mild meningeal symptoms from the first. They were, however, not at all severe or rapid in their movement.

Duration.—The duration in the eighteen tubercular cases with complete records varied between one and forty-four days, being respectively, 1 day, 6 days, 7 days, 8 days, 9 days, 9 days, 11 days, 12 days, 13 days, 13 days, 14 days, 14 days, 15 days, 17 days, 19 days, 31 days, 31 days and 44 days. The duration in the 18 cerebrospinal cases with complete records was 7 days, 10 days, 14 days, 15 days, 18 days, 3 weeks, 4 weeks, 40 days, 7 weeks, 7 weeks, 7 weeks, 10 weeks and 6 months in the cases which died, and 4 weeks, 4 weeks, 5 weeks, 9 weeks and 3 months in those which recovered.

One of the patients who recovered developed internal hydrocephalus later and probably died. Two, at least, of the others were left paralyzed and blind.

Temperature.—The temperature was normal, or nearly so, in five tubercular cases which were under observation from 4 to 6 days at or near the end of the disease. It was also normal in four of the cerebrospinal cases during periods varying from 4 to 16 days in the midst of the disease, after which they passed from observation. It was always under 101° F. in three of each class, and went over 101° F. in 10 of the tubercular and 13 of the cerebrospinal cases. The temperature was markedly irregular in 6 of the tubercular and 14 of the cerebrospinal cases. A terminal rise was frequent in both series.

Pulse.—A slow pulse was unusual in both classes. It was under 100 in but 4 of the tubercular and 2 of the cerebrospinal cases. The lowest points reached were 70 in one case, 80 in two cases and 90 in three cases. A slow pulse was never constant, was never present at two consecutive observations and never lasted, even intermittently, more than a few days. The rate was usually rapid and was over 140 some or most of the time in 13 of the tubercular and in all of the cerebrospinal cases, in several instances being as high as 200. The pulse rate was almost always irregular in both classes and there was always a terminal rise.

Respiration.—A low respiratory rate was also very unusual. It was under 20 in only three of each class, and when low, never persisted any length of time. It went over 50 in 14 of each class. The rate of the respiration was almost always irregular and there was usually a terminal rise. Cheyne-Stokes respiration was noted in 7 of the tubercular cases and in none of the cerebrospinal. It probably occurred much more frequently than appears from these figures, however, as it was undoubtedly not recorded in many instances.

Nutrition.—The nutrition of the babies with cerebrospinal meningitis was on the whole much better at entrance than that of the tubercular cases. Emaciation was usually very rapid in both classes, although in rare instances the nutrition was wonderfully maintained in the cerebrospinal form.

Mental Condition.—In most of the cases of both types the patients were stupid or unconscious throughout the greater part of the disease. One of the tubercular patients, however, was conscious up to the last two days, and another up to the last three days of life. Stupor did not come on in two of the fatal cerebrospinal cases until after twelve days and four weeks, respectively, and three patients who recovered were conscious throughout the whole course of the disease.

Vomiting.—All the patients with cerebrospinal men-

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ingitis vomited at some time. In five the vomiting occurred early and in seven late in the disease, while in the others it was present throughout. There was no vomiting in seven of the tubercular cases; in four it occurred only in the beginning and in four only late; in the others throughout the disease. Vomiting was explosive in only three of the cerebrospinal cases and in none of the tubercular.

Constipation.—Constipation was present in seven of the tubercular and six of the cerebrospinal cases, but was absent in the others. It was not marked in any case.

Restlessness.—Restlessness was noted in three of the tubercular and in none of the cerebrospinal cases.

Pain.—Pain was evident in five cases of each class.

Twitching.—This symptom occurred in six of the tubercular and in one of the cerebrospinal cases.

Convulsions.—Eight of the tubercular and nine of the cerebrospinal patients had convulsions. Nine of each class had none, while three of the tubercular and two of the cerebrospinal had none, unless they occurred after the patients passed from observation.

Neck Symptoms.—The neck symptoms; retraction, rigidity and tenderness, were much more marked in the cerebrospinal cases than in the tubercular, two or more of them being present in every case but one. They were all present in all but three cases, while in these there was either retraction or rigidity, or rigidity and tenderness. Retraction was noted in but six of the tubercular cases, rigidity in nine and tenderness in three, there being no neck symptoms whatever in eight. When they were present, moreover, they usually appeared late in the disease and were very inconstant. In the cerebrospinal cases, however, the neck symptoms usually appeared early and persisted throughout the disease, although they varied a great deal from time to time, not only in degree but in their combinations.

Paralysis.—There was no paralysis in any case in which there was no spasm. When there was spasm it was very difficult to determine whether there was or was not paralysis also, although in four of the cerebrospinal cases it was almost certainly present.

Spasm.—There was definite spasm of the extremities in thirteen of the tubercular and in fifteen of the cerebrospinal cases. It was absent in three of each class during the whole course of the disease, and in four of the tubercular and one of the cerebrospinal as long as they were under observation. Both upper and lower extremities were generally affected, but when only one was involved it was usually the legs.

Kernig's Sign.—Kernig's sign was present in three of the tubercular cases and in nine of the cerebrospinal. In three of the latter it was very marked. It was absent in eight of the tubercular and in six of the cerebrospinal cases throughout the whole course of the disease, and in four of the tubercular as long as the patients were under observation. In the cases in which it occurred it was usually inconstant and often present on but one side, the side also varying from day to day.

Knee Jerks.—The knee jerks varied from day to day in both series, being normal at one time and increased or diminished at another. They were almost always alike on both sides. They were increased at some time in eleven of the tubercular and in ten of the cerebrospinal cases; diminished in three of the tubercular and in five of the cerebrospinal and were absent in two of the cerebrospinal.

Ankle Clonus.—This was noted in but one case, which was of the tubercular type.

Strabismus.—Strabismus was noted in eight of the tubercular and in nine of the cerebrospinal cases. It is possible, however, that it may have been present in other cases and not noted.

Pupils.—Inequality of the pupils was noticed in but one case of each class. Failure of the pupils to react to light was noted in five of the tubercular and in six of the cerebrospinal cases. In most of these, however, the pupils at other times reacted to light. In the rest the reaction was always present.

The fundi were not examined in any of the tubercular cases, but were normal in five of the cerebrospinal cases, in several of which apparently the patients could not see. In one other, changes were found in the optic nerve.

Fontanelle.—The fontanelle was closed in three of the tubercular and in two of the cerebrospinal cases. It was level throughout the whole course of the disease in four of the tubercular and in two of the cerebrospinal cases, while in one of the tubercular it was level as long as the case was under observation. It was always elevated in seven of the tubercular and in eight of the cerebrospinal cases, and always depressed in one of each class. In the rest the condition of the fontanelle varied from time to time.

Abdomen.—The condition of the abdomen varied from time to time in most cases. It was always sunken in eight and always distended in two of each class. Spasm of the abdominal muscles was noted in but one case of each class. In the others the walls were always lax.

Spleen.—The spleen was palpable in three of the tubercular cases and in one of the cerebrospinal.

Leucocytosis.—The blood was examined in only four cases, two of each class. Both of the cerebrospinal cases showed a marked leucocytosis. One of the tubercular showed 9,000 leucocytes and the other 23,200.

Urine.—The urine was normal in the nine cases of the cerebrospinal form in which it was examined. It was normal in nine of the tubercular cases, while in three of the others there were evidences of slight irritation of the kidneys.

Eruptions.—There were no eruptions in any of the tubercular cases and in only one of the cerebrospinal. In this case there was a general herpetic eruption.

Lumbar Puncture.—One or more lumbar punctures were done in eighteen of the tubercular and in nineteen of the cerebrospinal cases. The pressure varied from time to time in the same case. It was designated as low in three of the tubercular and in seven of the cerebrospinal, normal in five of the tubercular and in two of the cerebrospinal, high in nine of the tubercular and in seven of the cerebrospinal, while it was not noted in three of each class. The character of the fluid varied from time to time in both classes. It was noted as slightly turbid in thirteen of the tubercular and eleven of the cerebrospinal, very turbid in two of each class and purulent in four of the cerebrospinal cases. The fluid was clear in three of the tubercular and in one of the cerebrospinal cases.

SYMPTOMATOLOGY OF MENINGITIS IN INFANCY.

It is evident from the figures just given that the picture of meningitis in infancy may differ materially from that which is given in most text-books as characteristic of the disease. Certain points of difference brought out by the analysis of these cases are especially

worthy of note. These are: the usual rapidity of the pulse and respiration; the infrequency and inconstancy of a slow pulse and respiration; the frequency of vomiting, both as an early and late symptom and the infrequency of explosive vomiting; the infrequency of constipation; the infrequency of manifestation of pain; the relative infrequency of convulsions and of Kernig's sign; the variability of the knee jerk; the absence of ankle clonus; the absence of bulging or even the presence of depression of the fontanelle throughout the whole or a part of the course of the disease in certain cases; the almost constant absence of retraction and spasm of the abdominal muscles; and the frequent diminution or absence of increase in the spinal pressure as shown during lumbar puncture. (It is probable, however, that the pressure shown by lumbar puncture often does not correctly represent the cerebral pressure.)

COMPARATIVE SYMPTOMATOLOGY OF TUBERCULAR AND CEREBROSPINAL MENINGITIS.

These figures also show certain points with regard to the comparative symptomatology of the two types of the disease which differ from the usual conception. It is noteworthy that the onset was sudden with convulsions or stupor in four of the tubercular cases, and that it was slow with no symptoms pointing directly to the nervous system until after several days or two weeks in seven of the cerebrospinal cases, while in only four of this type was there the sudden onset usually considered typical. The short duration of the disease in many of the tubercular case is very striking, being but a week or less in three and two weeks or less in twelve of the eighteen cases with complete data. The long duration in many of the cerebrospinal cases is also noteworthy, many lasting weeks or months.

The marked similarity in the degree of the symptoms in the two types is most striking. The behavior of the temperature, pulse and respiration was practically the same in both classes, as were also the mental condition, the vomiting and condition of the bowels. Convulsions and pain were about equally common. There was no essential difference in the behavior of the eye muscles. Spasm of the abdominal muscles was absent in both classes. Restlessness and twitching were rather more marked in the tubercular cases. These symptoms, however, are comparatively unimportant. The neck symptoms were much more marked and more constant in the cerebrospinal cases, while paralysis, spasm of the extremities and Kernig's sign were also, on the whole, more marked and more constant. The tendency to increased cerebral pressure, as shown by the level of the fontanelle, was also greater in the cerebrospinal form. The general condition of the babies was also rather better in this type. The spleen was enlarged rather more frequently in the tuberculous cases, but, as splenic enlargement is so common in infancy and arises from so many causes, it is probably of no importance in the diagnosis between these two conditions. The spinal pressure, as shown by lumbar puncture, was so variable and inconstant that no conclusions can be drawn from it. The character of the fluid, however, showed in a general way certain differences, the degree of turbidity being, on the whole, decidedly greater in the cerebrospinal cases.

The value of the presence of a reasonable cause for tubercular meningitis in differential diagnosis is shown by the frequency with which such a cause was present in these cases. There was a history of direct exposure to an adult with tuberculosis, usually a parent, in six. In another it followed a tuberculous knee and in two

others tuberculosis of the lungs. In one it was subsequent to a bronchopneumonia and in another to whooping cough. In five cases, however, there was not only no known exposure to tuberculosis and no previous illness, but the babies were entirely breast-fed.

The examinations of the blood were too few to be of value in differential diagnosis. They showed the usual leucocytosis in the cerebrospinal form. The high count of 23,000 in a tubercular case, however, shows that the presence of a high leucocytosis does not justify the diagnosis of cerebrospinal meningitis.

Repeated lumbar punctures were done in a number of cases of both forms for the relief of pressure, the fluid being withdrawn until the fontanelle was level or slightly depressed. Improvement in the symptoms and in the patient's comfort was noticeable after each withdrawal of fluid, the symptoms returning again with the increase of the fluid. In no case, however, was any effect on the course of the disease noted.

CONCLUSIONS.

The picture of meningitis in infancy is materially different from that of meningitis in childhood and from that given in most text-books. The tubercular form has a more sudden onset and a shorter course than in later life. The symptomatology of the tubercular and cerebrospinal forms is essentially the same at this age, although the symptoms of spinal and, to a less extent, of cerebral irritation are, on the whole, more marked in the cerebrospinal. These differences, however, are insufficient to justify a differential diagnosis. The history or presence of a reasonable cause for the tuberculous form points strongly to this disease, but such evidence is frequently entirely wanting. A positive diagnosis between the two forms is impossible on the symptomatology and can only be made by an examination of the cerebrospinal fluid obtained in lumbar puncture. Lumbar puncture has no curative value in cerebrospinal meningitis, but is very useful for the relief of symptoms in both forms.

DISCUSSION.

DR. F. S. CHURCHILL, Chicago, said that Dr. Morse's experience coincides exactly with his and emphasized his remarks about the value of blood cultures. All physicians know how difficult it is to make a diagnosis of meningitis and how the blood cultures will often clear up the situation. The examination of the sediment of the spinal fluid is very important. Almost invariably it will show the character of the cells—the excess of lymphocytes, especially in tuberculosis. He asked Dr. Morse whether any differential blood count was made and if so if there was any difference in the lymphocyte count. Dr. Churchill stated that he saw an interesting case a year or two ago in which lumbar puncture was done; not, however, for diagnosis, but as a matter of scientific interest. The first puncture showed this excess of lymphocytes, but no tubercle bacilli. The diagnosis was confirmed at autopsy by finding the characteristic lesions. He also asked how many times a day examination was made for Kernig's sign. His observations show that sometimes one will find it and at other times it will not be possible to get it. At the autopsy of the case referred to one of the best pathologists in Chicago found no evidence of tuberculosis, except in the meninges.

DR. W. P. NORTHRUP, New York City, said that he thinks that there is no standard of psychical symptoms in meningitis. In the last epidemic of meningitis in New York it fell to his lot to classify and group the symptoms observed by the medical inspectors, and he came very close to the same hard rock that Dr. Morse struck. It seemed to him that the cases did not present the symptoms which would be expected. Dr. Northrup asked if there is a slow pulse in the onset of the disease. He indorsed what Dr. Morse and Dr. Churchill said

in regard to the lumbar puncture. Lumbar puncture ought to settle the diagnosis as to tuberculous meningitis. He mentioned one case in which practically no fluid could be obtained in the lower portion of the spine; on making the puncture from the upper portion as much as two ounces was withdrawn and this was repeated to take off the pressure. He said that Dr. Morse's paper is interesting in showing the variations from the standard set by the text-books. This has been observed in commission work. It seemed impossible in putting on a number of new inspectors to direct them to judge a case by a certain standard.

The lumbar puncture is also good for another purpose; for instance, in the case referred to an abscess developed in the vault of the pharynx. It seems to Dr. Northrup a good routine plan to do lumbar puncture to give some knowledge of the prognosis.

He said that during the epidemic in New York he had one patient who was sick for 155 days. She was a girl in splendid physical condition, a basket-ball player, and weighed about 120 pounds. In the last days of her illness she scarcely weighed forty pounds. This emaciation seems to Dr. Northrup to be one of the marked features.

DR. C. G. KERLEY, New York City, stated that Dr. Morse's observations coincide with his own. He agrees with Dr. Morse in regard to the value of lumbar puncture in the differential diagnosis of tubercular and spinal meningitis. Routine lumbar puncture is also valuable in another respect; for instance, it is very embarrassing for a man to make a diagnosis of tubercular meningitis, cerebral or spinal meningitis, and have the child get well after the administration of a dose of castor oil. It is bad for the practitioner and worse for the consultant. In recent examinations for the tubercle bacillus twelve cases have shown this bacillus in the meshwork of fibrin which sometimes forms in the spinal fluid.

DR. ARTHUR W. FAIRBANKS, Boston, mentioned two cases, one on account of the peculiar character of the onset, the other because of the peculiar postmortem condition. Both were cases of tuberculous meningitis in children 6 years of age. The first patient was a girl, brought to him because of uncontrollable disobedience, formerly having been a docile child. The condition began with having a temperature of about 101. The mind was perfectly clear, there being nothing but the lack of the former docility. On attempting to examine her the nearest approach was resisted with the greatest ill temper and attempts to scratch and bite. In striking contrast to this was the change which occurred eight days before death, when all resistance ceased and she allowed him to examine her with perfect freedom. Sensation was diminished. Her expression was that of having just wakened from a dream, and this same expression Dr. Fairbanks has seen in two or three other cases. She had internal strabismus in the right eye and had previously had it in the left. The pulse was at first irregular, but became normal. There was sinking away of the abdomen. There was no motor paralysis, except that of the abdominal muscles. On spinal puncture the clot in clear fluid did not reveal tubercle bacilli. She had some weakness in one extremity. The other case had been received in the ear ward of the hospital for otitis. There was improvement and transference was made to the medical ward. Tremor was noticed in each extremity. The discharge from the ear ceased completely. There was no twitching or other motor disturbance. This condition was promptly followed by ataxia and the child became unable to walk. The first thought was of an abscess in the cerebellum from the trouble in the ear, but the trouble had cleared up. During the last twenty-four hours the psychical condition changed. Dullness came over the child and it could not be prevented from falling asleep. The pulse suddenly dropped from 150 to 75, while the temperature steadily rose. Puncture of the spinal canal was made and the fluid showed a fine clot in the clear fluid. This illustrates Dr. Morse's point relative to the relief of symptoms. The child immediately brightened up, though it died soon after. The entire surface of the cerebellum was covered with tubercles and section of the vermiform showed complete caseation. The chief symptoms were ataxia and tremor, dullness of intellect, rise of temperature and lowered pulse.

DR. EDWIN E. GRAHAM, Philadelphia, said that in the differential diagnosis of tubercular and spinal meningitis he thinks almost all physicians are agreed on the value of lumbar puncture. Of course, the non-tubercular form may become the tubercular form. Recently he saw that occur in the wards of the Philadelphia Hospital. The child had been in the hospital for a non-tubercular meningitis for several months, and had been under observation in another institution for about four months. A few weeks before death, fluid removed by lumbar puncture showed the condition to have become tubercular and this was proved at autopsy. There must be a borderline where these two conditions meet, where the non-tubercular variety may become tubercular.

DR. WILLIAM J. BUTLER, Chicago, said that Dr. Morse's careful clinical study has presented the differences between a meningitis of infancy and that of later childhood so clearly that it hardly needs discussion. In the diagnosis of meningitis in infancy, however, the rigid neck, retracted neck, Kernig's sign and Babinski's sign all seem to have a minor place, whereas they are almost essential in the diagnosis of meningitis in adult life. Concerning the differentiation of tubercular and cerebrospinal meningitis, the diagnosis seems practically impossible, unless the meningococcus is found in the spinal fluid. In so far as the blood findings are concerned, Dr. Butler's experience is that they are practically valueless so far as leucocytosis is concerned, although he is in favor of the lumbar puncture because in the tubercular form one will find as high as 30,000 leucocytes present.

DR. J. L. MORSE said that no differential count of white corpuscles was made in the blood. Kernig's sign was only examined for daily; it may have been present at other times of the day when not tested. He feels that it is of comparatively little consequence. Concerning the leucocyte count and a differential diagnosis, of course, a high leucocyte count does not rule out tubercular meningitis, but he thinks that a leucocyte count almost rules it out. In regard to meningitis and the lumbar puncture, he said that at the clinic at the *Infants' Hospital* lumbar puncture will be done and the various fluids of spinal meningitis will be shown.

THERAPEUTIC VALUE OF CHRYSOPHANIC ACID IN DERMATOLOGY.*

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I desire to present in this paper some clinical observations and suggestions as to the value of chrysophanic acid as an effectual therapeutic remedy locally in certain superficial parasitic skin diseases.

Chrysophanic acid is obtained from "Goa powder" which is found in the heart wood or cavities formed by decay in the wood of "*Andira Araroba*," a tree found in Brazil. It is also found in Rhein, U. S. P., and is produced by the oxidation of Chrysarobinum, U. S. P., a constituent of Goa powder. Lieberman proved that in the latter the acid was very largely present and easily transformed by oxidation. It is a pale orange-yellow microcrystalline powder, odorless and tasteless and which, on exposure, to air, turns a brownish yellow color. The remedy has long been used in Brazil, and has spread through Portuguese commerce to India and the East, while its general European and American employment is comparatively recent in certain varieties of skin disease.

It was first noticed in 1876, in London, England, in Fox's "Skin Diseases of India," and then since then it has at times been favorably endorsed as a dermatological remedy.

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