in the patient. Here, again, arise the same doubts as in the preceding series of cases.

It follows, then, that we are, as yet, unable to state, with any degree of certainty, the duration of the stage of incubation. Such stage, nevertheless, does exist, and the future may delineate its characteristics and measure its exact duration.

CHILL.

A chill is almost always the initial symptom of the sudden invasion of pneumonic fever. It is usually accompanied by rigors and is generally more intense and pronounced than in any other malady except pyæmia¹⁵ and malarial ague. The duration of the chill varies from a few minutes to several hours;¹⁶ its decline being gradual.¹⁷ In some cases the chill is replaced by a sense of chilliness, alternating with flashes of heat—if the patient is in bed and quiet he feels feverish, but with the slightest jar or movement chilly sensations course up and down the back, spreading thence, as from a centre, to various parts of the body. This continues for a short time and is replaced by a sensation of heat until another movement causes the chilliness to reappear. The profound chill often passes off with this sort of chilliness. The duration of this recurrent chilliness is usually longer than that of the decided chill—sometimes being twelve or more hours. There is usually a single chill, although there are occasionally multiple recurrences.¹⁸ It usually immediately precedes the development of the local symptoms, but in some cases it may precede these by several hours or days. The initiatory chill was present in 86 per cent. of my cases. In 199 cases the chill was noted as being severe; in 97 there was "a chill;" in 76 there was "a light chill," and in 56 there was simply "chilliness."

The initiatory chill was present in 92.6 per cent. of Fismers' ¹⁹ cases; in 92.5 per cent. of Lebert's ²⁰ cases; in 82 per cent. of Chomel's ²¹ cases; in 80 per cent. of Huss' cases ²²; in 79 per cent. of Grisolle's cases; ²³ in 60 per cent. of Speck's ²⁴ cases; in 37 per cent. of those analyzed by Stortz; ²⁵ in 63 per cent. of Schapira's ²⁶ cases; in 94 per cent. of Wunderlich's ²⁷ cases; in 65 per cent. of Fenwick's ²⁸ cases; in 77 per cent. of Louis' ²⁹ cases; in 75 per cent. of Lépine's ³⁰ cases; in 72 per cent. of Kocher's ³¹ cases; in 69 per cent. of Bleuler's ³² cases; in 64 per cent. of Fox's ³³ cases; in 60 per cent. of Durand-Fardel's ³⁴ cases; in 50 per cent. of Juergensen's ³⁵ cases; in most of Gerhard's ³⁶ cases and in all of the 63 cases of the Loberg epidemic.³⁷

As to the severity of the chill Fismers ³⁸ found that of 219 cases, 84 had rigors, 41 had a chill, 42 had a light chill, 35 had a very light chill and in 17 the chill was lacking.³⁹

Scheffels ⁴⁰ in describing the appearance of the chill says that the patient suddenly felt a sensation of

warmth, then heat, and, a short time afterwards a chill.

Chomel ⁴¹ thought that when the attack began at night the chill was generally absent. This, however, is contrary to my experience. Early in my professional career I was impressed with the remarkable frequency with which the pneumonic chill occurred at night and during the hours of sleep, and subsequent observation has only confirmed my early conclusions; for of 428 cases the chill occurred between the hours of 9 P.M., and 6 A.M., in no less than 231.⁴²

Chill is, however, absent in certain forms of the disease or conditions of the patient. Thus in the case of young children it is usually replaced by slight chilliness, coldness of the extremities, nose and ears, paleness of the surface, blueness of the nails, etc.⁴³ In the aged, also, an initial chill is less frequent than in adults, but when a chill occurs it is more distinctive of pneumonic origin. In the weak, cachectic and diseased it is also often lacking.⁴⁴ This is also true of some epidemics.

Juergensen ⁴⁵ states that very fleshy persons escape the chill, but I can not confirm the statement, it so happening that every fleshy person whom I have observed with this disease had a very distinct initiatory chill.

Chills may occur after the disease has been fully established ⁴⁶ and even during convalescence.⁴⁷

A young lady, 17 years of age, was taken, Apr., 28, 1880, with a chill, followed by cough, pain in the right side, sanguineous expectoration and the ordinary signs and symptoms of pneumonic fever locally affecting the apex of the right lung. Crisis occurred on the seventh day and convalescence seemed fully established, when, three days later, she had a second severe chill and rigor, followed by a pulse of 116 and a temperature rising to 102.5°. The febrile symptoms continued only a few hours, after which convalescence was uninterrupted.

A CASE OF SPINA BIFIDA WITH CURIOUS DISTURBANCES OF THE SEXUAL FUNCTIONS.

BY SYDNEY KUH, M.D.,

FROM CHICAGO.

ASSISTANT AT THE CLINIC OF PROF. ERB, IN HEIDELBERG.

Philipp Eller, twenty-six years of age, a tailor, was admitted into my ward on the 9th of July, 1891. His father had died from dropsy, there was perhaps some case of phthisis in the family, certainly no nervous taint in the ancestry. The patient has ever since the time of his birth, a slight prominence in the sacral region of the spinal column upon which hair grew ever since he can remember. It cannot be ascer-

¹⁵ Including puerperal fever.

¹⁶ In my cases the duration was from a few minutes to six hours. Andral, *Med. Clin.*, Vol. II, p. 140, mentions a case in which shivering continued for more than five hours. See also Schuyler, *N. Y. Med. Jour.*, Oct. 13, 1883, p. 400.

¹⁷ This point seems to have escaped the notice of writers.

¹⁸ See also Schapira, *Inaug. Dissert.*, Würzb., 1877, S. 29; Stortz, *Inaug. Diss.*, Würzb., 1884, S. 57, and others.

¹⁹ *Deutsche Arch.*, I. K. Med., Bd. XI, 1873, S. 391.

²⁰ *Klinik d. Brustkrankheiten*, Tübingen, 1873.

²¹ *Pneumonie*, Leipzig, 1841.

²² *Lungenentzündung*, Leipzig, 1861, S. 33 u. 144.

²³ *Inaug. Diss.*, Würzb., 1870, S. 7.

²⁴ *Inaug. Diss.*, Würzb., 1884, S. 57.

²⁵ *Inaug. Diss.*, Würzb., 1877, S. 29.

²⁶ *Inaug. Diss.*, Tübingen, 1858, S. 25.

²⁷ *Lancet*, 1891, Vol. I, p. 248.

²⁸ *Traité de la pneumonie*, Paris, 1841.

²⁹ *Rech. sur Fiev. Typh.*, T. II, p. 128.

³⁰ *Pneumonie*, Wien, 1883, S. 38.

³¹ *Lungenentzündung*, Würzb., 1866, S. 38.

³² *Inaug. Diss.*, Zürich, 1865.

³³ *Reynold's Syst. Med.*, Phila., 1880, Vol. II, p. 163.

³⁴ *Mal des vieillards*.

³⁵ *Ziemssen's Handb.*, Leipzig, 1877, Bd. V, S. 83.

³⁶ *Am. Jour. Med. Sci.*, Vol. XIV, p. 328.

³⁷ *Am. Jour. Med. Sci.*, Jan., 1883, p. 202.

³⁸ *Op. cit.*

³⁹ For further information consult Doubleday, *N. Y. Med. Rec.*, Mar. 28, 1885; Hermann, *Lungenentzündung*, München, 1880; Pause, *Lungenentzündung*, Leipzig, 1861; Stortz, *Op. cit.*, S. 57, et al.

⁴⁰ *Inaug. Diss.*, Würzb., 1886, S. 5.

⁴¹ *Op. cit.*, S. 151.

⁴² See also Fricke, *Inaug. Dissert.*, Göttingen, 1886, S. 22; Hart, *Jour. Am. Med. Ass.*, Oct. 10, 1885, p. 393; Juergensen, *Op. cit.*, S. 393, and others.

⁴³ Convulsions, sopor, coma, etc., sometimes take the place of the chill, even in adults, as shown by the cases reported by Farquharson.—On some Forms of Pneumonia, London, 1871.—and by two in my own collection. For further information see Holt, *N. Y. Med. Rec.*, Feb. 14, 1885, p. 174 and others.

⁴⁴ See Greneau de Mussy, *Gaz. des Hôp.*, Avr. 9, 1846; Huss, *Op. cit.*, S. 33, and others.

⁴⁵ *Op. cit.*, S. 83.

⁴⁶ See also Haw, *London Lancet*, 1887, Vol. II, p. 911; Heiss, *Inaug. Diss.*, München, 1857; Sturges, *Nat. Hist. Pneumonia*, London, 1876; Swett, *Dis. Chest*, N. Y., 1856, p. 99, and others. It has been supposed that chills occurring after the disease has been established were indicative of the involvement of fresh pulmonary territory, but my cases afford no evidence in favor of this view.

⁴⁷ Several such cases are in my collection.

tained at what time he learned to walk, but he is positive that he could go to school without assistance at the age of six years. He could not, however, walk as well and as long as other boys of his age, the legs, especially the left one tiring rapidly. Later on the lower extremities, particularly below the knee, remained unproportionately thin, and the toes stood in abnormal position, all of these symptoms being more pronounced on the left side. There was no spontaneous pain. Sensation had always been impaired somewhat in left leg and foot. It can not be ascertained with any degree of certainty whether vaso-motor or secretory disturbances existed.

The discharge of urine had always been impaired, and there had been chronic constipation; both excretions invariably pass off together, so that the patient is compelled to sit on the water-closet whenever he wishes to pass his urine. The sexual impulse was but very slight. He had never attempted cohabitation. Up to about a year ago he had occasionally ejaculations of semen accompanied by slight erections of very short duration, especially when he was compelled to move rapidly or to do fatiguing, heavy work. These erections were also very frequent while the patient was being shaved, came on regularly whenever the barber went over his face twice (gave him a "close shave") and also came now and then when he had his hair cut. There was never more than one ejaculation during one shaving or hair-cutting.

During his boyhood he suffered a good deal from headaches, which were accompanied by exhaustion and a sensation "similar to fever." During one of these attacks he, in his words, lost consciousness "and ran about the room, shrieking." There never had been any epileptic fits. He made but slow progress in school, learned with great difficulty. Strong odors immediately gave rise to headaches.

It happened now and then that somebody struck the prominence on his back. Immediately his lower extremities would fly from under him, he would fall on his buttocks, the legs taking the tailor position, and being utterly powerless. At the same time he had the sensation of something piercing his head, he would shriek and become unconscious for a few moments. His falling was connected with a sudden very intense pain in the legs and the head. For some time he could not succeed in arising, the entire body trembled, and he yelled loudly. For two days thereafter he would feel as though he had been whipped; as soon as anybody approached him he would begin to tremble in the apprehension that something might happen to his back.

There were never any signs of an affection of the cerebral nerves or of those of the upper extremities. The power of speaking was quite normal. No polyuria, but he had to urinate more frequently than other people, especially after having received a blow in the small of the back.

There had been no stiffness of the legs up to December 27, 1889, on which day he was taken with influenza, and on the following morning he noticed that his legs had become stiff and showed spasmodic contractions. No pain, no disturbance of sensation. After this attack of influenza the spastic symptoms increased in intensity, and since a year there is also tremor of the right, rarely also of the left arm after work. There has not been an erection or ejaculation for one year. When he was sewing the fingers of the right hand would occasionally spread asunder. This

exacerbation had been progressive up to the date of admittance to the hospital.

During the last year electricity and warm baths had been used, under which treatment his troubles grew worse. In the month of May, 1891, he suffered from an unknown disease, accompanied by fever.

State on admission.—Well built man of medium size. Muscles well developed. The intelligence of the patient is rather below the average; he is very talkative. The skull is very narrow in its anterior portion, very broad in the parietal region. The greatest circumference measures 57.3 cm., somewhat more than the average.

The cerebral nerves, the upper extremities and the thoracic and abdominal viscera are normal.

In the region of the sacrum in the median line there is a tumor approximately of the size and form of half an orange lying immediately below the skin and fluctuating. This part is very sensitive to pressure. The posterior osseous wall of the spinal canal is absent in the entire length of the sacrum. The tumor is covered with a dense growth of long black hair, its centre being occupied by a horizontal retraction of the skin. Below the prominence, corresponding to the point of the os coccyx the skin is adherent to the bone and retracted in the form of a funnel. Directly above the tumor, *i. e.*, in the lower part of the lumbar region, the spine is somewhat sensitive to pressure.

There is no marked atrophy of the lower extremities, the left being but slightly thinner than the right. There are fibrillary contractions in the muscles of both legs, more pronounced on the left than on the right side. The patient is able to move the limbs in all joints. The left knee is slightly flexed, cannot be extended completely, either voluntarily or passively. The M. ileo-psoas, the quadriceps cruris and peroneal muscles are paretic on the left side. There are marked tonic muscular spasms in the left, slighter ones in the right limb, especially in the flexors of the knee and the adductors. There is no disturbance of coördination, no intention-tremor. Both mechanical and electrical irritability of the muscles are unchanged, only that mechanical stimuli produce marked fibrillary vibrations. Pes equinovarus, more pronounced on the left than on the right side.

Sensibility.—There is a diminution of sensibility to touch in the right thigh, and in the left leg below the knee; of the sensibility to pain in the entire right lower extremity; of the sensibility to temperature in the left leg below the knee. The patient locates the sensations correctly.

Reflexes.—The abdominal and cremaster reflexes are normal on both sides, the right plantar reflex is not so marked as that of the left. No reflex from the tendo achillis. There is a reflex upon tapping the tendon of the M. tibialis posticus, also stronger on the left side. Adductor reflexes rather excessive on both sides.

The lower extremities perspire less than the rest of the body. They are covered with short black hair.

The urine contains neither albumen nor sugar. The temperature is normal; the pulse is strong, its rate varies from 80 to 112.

Treatment.—Galvanic current applied to the spinal cord and the lower extremities. Kalium iodatum 0.75–1.5 gr. pro die. After three days the patient is able to ascend steps without assistance, which he had

been unable to do. Later on he did not stand kalium iodat. well, and the medicine was changed to pills of argent. nitric.

On the 17th of September, 1891, Eller was discharged from the hospital. There were then no clonic contractions of the muscles nor pain. The patient was able to walk with greater ease, to ascend steps without difficulty. His weight had been increased by 6.5 pounds.

Remarks.—As to the diagnosis there can be no doubt that the patient suffers from spina bifida. The tumor of the sacral region covered by long hairs, fluctuating and evidently in connection with the central nervous system, the pes equino-varus, the disturbance of sensibility and of the functions of the sphincters are conclusive proofs. The trouble grew worse after an attack of influenza. Experience has taught that la grippe is both very liable to produce nervous disease of all kind and to aggravate existing ones. The curious disturbances of the sexual functions, especially their irritability to abnormal stimuli have to my knowledge, not been previously observed in cases of this kind.

A STUDY OF THE REQUIREMENTS OF THE AVERAGE PROSPECTIVE MEDICAL STUDENT IN 1892.

BY BAYARD HOLMES, M.D.

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It has been often questioned whether the average medical student is better educated to-day than ten years ago or not. Not knowing the species then, I cannot answer.

I happen to have in my possession evidence of the scholarship of the average man who proposes to study medicine to-day. This evidence has come in the course of my regular correspondence during the past year. For the purpose of this paper I have selected one thousand consecutive correspondents and tabulated their educational qualifications. These are a continuous series and they include *every* correspondent, who gave me the necessary information, going back far enough to secure a necessary decimal, one thousand. None of them go further than one year back.

1. Number of prospective medical students having A.B., B.S., or other corresponding or succeeding degrees	185
2. Graduates of High Schools which are accredited to State Universities	211
3. Graduates of State Normal Schools or City Normal	80
4. Graduates of Dental or Pharmaceutical Schools	69
5. Holders of certificates of completion of pre-Medical course in universities	25
6. Other adequate education but without diploma	252
7. Total number who present evidence of sufficient education for admission to the College of Physicians and Surgeons, or of any college requiring only the minimum of the Association of American Medical Colleges	822
8. Number who do not present evidence of such education though filling out the blanks in other particulars	198

Total consecutive correspondents considered . . . 1000

Many of the best educated men are to be found in class 6. These men cannot present any diploma, but are in many instances better educated than the graduates of scientific or high schools. We would conclude then that less than twenty per cent. (18.5) of

prospective medical students are graduates of colleges with the bachelor's degree, that a little more than twenty per cent. (21.1) are graduates of accredited high schools, that two and a half per cent. only are graduates of pre-medical courses in universities, and twenty-five per cent. are able to pass an examination in English, mathematics, physics and Latin, as presented by the rules of the Association of American Medical Colleges. Thus it appears that only twenty per cent. of prospective medical students are shut out by the requirements of the Association. These statistics may encourage some timid schools to insist on this requirement of the Association.

It may be asked, are these statistics fair and reliable? So far as the students are concerned they are probably sufficiently reliable for our purpose. It may be reasonably premised that students who have the required education more readily fill out the blanks than those who cannot answer the questions in the affirmative. The blank was as follows:

Name. Age. Nativity.
Education. What?
Have you a degree? Where obtained? Time required
Have you graduated at a high school?
If so, what did your course cover in Mathematics, Physics and Latin?
Have you studied in a medical college? What one? When?
Address. P. O.
County. State

Another source of error is to be found in the fact the correspondence was usually begun through physicians and educators and the names of those only were asked for who had "a good preliminary education." These statistics are derived largely from the six States surrounding Chicago.

With these facts before us it may be seriously asked if it is advisable to make the degree A.B. or B.S. a requirement for admission to the medical school. It is certain that all our schools could not make such a requirement. It would probably pay one or two favorably located schools to re-organize their methods and conclusions so as to give a course adapted to the educated student. Such schools would have a hard struggle for a few years, and would need a temporary or permanent endowment, but in time they would secure their own. Their course would be shorter. It would be conducted on different plans and by a different sort of men, but the success would be enviable.

At the college that I represent one hundred and twelve students asked for entrance certificates in October 1892; of these, one hundred and one presented evidence of scholarship from colleges or accredited high schools, eleven wrote the examination. One failed and was refused. Seven were unable to write the examination in Latin satisfactorily, and were conditioned in that study. Three wrote the whole examination satisfactorily.

THE laws of Michigan forbid any railroad within its borders to employ other than total abstainers from alcoholics as engineers, train-dispatchers, firemen, brakemen, or other railroad servants. The penalty is said to be \$500 for each offence. Yet many of the passenger boats in said State have open bars on board for the patronage of all.—*American Lancet.*