We may next proceed to demonstrate that many unusual or pathological cases of growth may be due to the ratios or quantities of growth. In the signs of old age we see altered proportional growth; these first mentioned are almost normal to the time of life, the latter are clearly pathological, as tending to destroy the life of the individual. At the approach of old age we see diminished growth; atrophy of the hair, of the scalp, the skin, the muscles, and the heart; while fat may either be absorbed or accumulated about the abdomen, etc. At the same time, increased quantities of growth may occur in the prostate, and in the hair bulbs of the chin of the female; while, in some cases, overgrowth is further seen in the development of epithelioma, sarcoma, and cancer. Examples were then given, showing the results of varying ratios in the growth of different tissues.

Passing on to consider the causes of curvature in ricketty bones, it was suggested that some are produced by mechanical strain, while others are due to unequal bilateral growth of the shafts. Curves which are only exaggerations of the natural curves, and which are symmetrical, are probably due to unequal bilateral growth, such are seen in children who have never walked, and whose muscles are feeble; further, in such cases the skull is often defective in form, being a bony growth, but slightly acted on by muscles at the part most misshapen. It was shown that Glisson put forward very similar views, and facts concerning the growth of stems of plants were used as illustrations of the hypothesis.

Defects in proportional growth are often seen in teratological specimens. Various specimens were shown in support of this statement; in some cases there was a history of inheritance of the deformity. It was argued that inheritance was rather that of a stimulus to nutrition than of the pabulum, while the case of an hypertrophied kidney when its fellow had been destroyed by calculus, was an example of attendant proportion of growth from over-supply of blood. Cases of coincident deformities were given, and it was shown that often the brain is likewise defective.

Analogies may be made as to the distribution or seat of the parts affected by a pathological process. Many skin-diseases are maculated; affecting small loci of tissue, symmetrically or asymmetrically distributed, among young infants; in the spontaneous movements of many small parts we have evidence that separate scattered loci of brain-tissue are in action. Some processes are considered pathological when asymmetrical, but not so when symmetrically distributed; sunburn is normal, freckles less so, one-sided pigmentation abnormal.

Time is an attribute of growths that may give them an abnormal character, as late or irregular dentition, development of pubic hair before adolescence, premature ossification of the skull, etc. These various considerations lead us to study the forces which control the time, quantity, and kind of growth; for example, the effects of light, pressure, or mechanical irritation, etc. Many examples were given. In conclusion it was shown that motor actions may be described in terms of time and quantity of movements, and growth in terms of time, quantity and kind of action in the component parts; and evidence was advanced that these attributes, which give special characters, may be controlled by physical forces.

M. PASTEUR'S TREATMENT OF HYDROPHOBIA.

By DR. A. LUTAUD,

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MEDICAL men have all been acquainted with the discussions that have arisen during the year 1886 concerning hydrophobia, and it has, moreover, excited great interest among the public generally. It cannot be denied that the wonders published by the great chemist of the École Normale have created much enthusiasm, and that, after the announcement of Meister's cure, a fantastic number of supposed rabid individuals flocked to M. Pasteur's laboratory. Up to this day over 3,000 persons have been under the celebrated treatment. But it must be admitted that if the public at large took a frantic fancy to the new method, in many instances medical men were more reserved in their opinions. Some even went so far as to say that M. Pasteur's treatment contradicted pathological and clinical truths; that the patients inoculated at the École Normale were in no danger of hydrophobia, etc., etc.

In the *Journal de Médecine de Paris* I have for my part fought energetically against such crying misleadings, placing myself on a clinical as well as theoretical ground. But time only could definitely settle opinions. Fifteen months have now passed since the world-famous lecture at the Académie des Sciences, on October 25th, 1885, was delivered, in which MM. Pasteur and Vulpian proclaimed that

the new treatment was a sure preventive of hydrophobia. As the laboratory of the Rue d'Ulm has been, correctly or not, accused of being silent touching unfavourable facts, it may be of interest to your readers to set the matter in its real light. It is known that, despite M. Pasteur's treatment, a considerable number of persons have died from hydrophobia in 1886. The fact cannot be denied.

In the following table the exact list of persons who died in 1886, after having been treated by M. Pasteur, is given. It only contains the French patients. Many foreigners have also died, as is well known; among them three of the few that came over from England.

In the abovementioned it is to be observed that nine patients have lately died without presenting the generally known symptoms of hydrophobia; they suffered from paralysis, and it was the points where they had been inoculated, and not those where they had been bitten, that were painful. The symptoms were very much like what is observed in the animals inoculated by M. Pasteur with his artificial virus.

The following observations, made by Professor Germe, of Arras, and communicated to the Academy of Medicine of Paris by Professor Peter, can be considered as typical for the nine cases of paralytic hydrophobia noted in December and January.

L. N., aged 42, a basket-maker, was traveling in the country with a little cart, under which a dog was tied, on November 12th, 1886, near Avesmes le Comte; he let his dog loose, and was immediately bitten on the right leg. He seized the dog, tied him up, and killed him. The dog had never ceased taking food. The *post-mortem* examination of the dog was made at Arras by a veterinary surgeon, who stated that he could find no symptoms proving that the dog was rabid. The corpse was sent to M. Pasteur, and the family is still waiting to know if the dog was rabid or not. N. remained eleven days at M. Pasteur's laboratory, during which he received twenty-two inoculations, to the number of even three in one day. After each inoculation he complained of giddiness, felt sick, and vomited. On his return to Arras, on November 29th, nothing remarkable was observed except increase of appetite, which had also been the case while staying in Paris. During the night of December 10th-11th, intense pain was felt in the parts of the body pricked by the inoculations, the pains rapidly invading the spine, and continuing until the last moment. The patient was restless, and said that he was suffering like after the inoculations in Paris, and was sure he would die. A physician who was called in supposed first that N. was suffering from lumbago, and, later on, from inflammation of the spine. The above symptoms were followed by great difficulty in breathing, salivation, convulsions of the muscles of the face, arms, and thorax; the patient had nightmares, was restless, and sweated profusely; but there were no general convulsions or hydrophobia. He could swallow easily, except on the last two days of his life. On the 14th two physicians were called in consultation, and they were in doubt as to whether it was an inflammation of the spine or the result of the inoculations. Paralysis set in soon after; the sight got weaker and weaker, till it was completely lost; breathing became more and more difficult, and saliva issued abundantly from the sides of the mouth. At last the patient died on December 17th, at 11 P.M.

Although the symptom of hydrophobia was absent, I am of opinion that N.'s death was due to hydrophobia. Considering that the pain was not felt in the parts bitten, nor along the nerves of the leg, but at the points of inoculation, also along the nerves placed between these points and the spine—pains of which the patient never ceased to complain from the first day to the last—it may be allowed to say, without going too far on such a delicate subject, that the unfortunate man N., whose destiny it was perhaps to die sooner or later from hydrophobia, began by dying of *rabbit-derived* hydrophobia.

The other cases of paralytic hydrophobia being very similar to the above case, it would be useless to enter into more details.

But the question now presented itself under quite a new light. Pasteur's method was formerly considered as useless and without any efficacy: must it now be accused of being actually harmful?

Professor Peter, who had silently observed the facts as they occurred during a whole year, thought it was time to take part in the discussion. At the sittings of the Academy of Sciences held on January 11th and 18th, he gave an account of several cases of paralytic hydrophobia, and came to the following conclusions:

1. Has the death-rate from hydrophobia been lowered in France during the year 1886 by Pasteur's method? Answer: No.

2. Does the death-rate tend to rise on account of the intensive method? Answer: Yes.

Then, addressing Professor Vulpian, Dr. Peter continued: "How is it that you, a medical man, did not see that the case of Meister was not a convincing proof, one case having in therapeutics no significance whatever? Could not the child Meister have five chances out

Table giving the Mortality among the French Patients treated in M. Pasteur's Laboratory in 1886.

No.	Name.	Age.	Part of Body bitten.	Date of Bites.	Dates of Treatment.	Description of Treatment.	Date of Death.	Cauterised or not.	Animal.	Observations.
1	Videau, Matthieu	3	Forehead	Feb. 24	Feb. 27—March 7	Spinal cords of 14 to 5 days.	Sept. 24, 1886	Not	Dog	Slightly bitten. Incubation remarkably long. Convulsive hydrophobia. Incubation, 200 days.
2	Lagut, Elvina	11	Inferior lip	May 18	May 24—June 2	Spinal cord of 14 to 5 days.	June 17	Not	Dog	Convulsive hydrophobia, canine.
3	Bouvier, Marius	40	Hand	April	—	—	July 21	Not	Cat	Convulsive hydrophobia. M. Pasteur's supporters say that it was a case of delirium tremens. Incubation long.
4	Cledière, Emile	21 mths.	"	June 17	June 21—June 30	—	Aug. 17	Not	Dog	Canine hydrophobia. Incubation, 18 days. Convulsive hydrophobia. Incubation, 60 days. Convulsive hydrophobia. Incubation, 81 days. Convulsive hydrophobia. The laboratory says the child died from meningitis; but the post-mortem examination, made at the hospital at Evian, goes against that opinion. The child died of hydrophobia after having been bitten.
5	Peytel, Henri	6	"	" 28	June 30—July 9	—	July 16	Not	"	
6	Leduc, Zélie	70	"	July 14	July 18 to 25	—	Sept. 10	Not	"	
7	Magneron, Norbert	18	"	" 25	August 1 to 7	—	Oct. 16	Cauterised 3 days aiter.	"	
8	Moerman, Alfred	40	"	June 28	August 11 to 21	—	Sept. 7	"	"	
9	Christin	12	Forehead	June	July 1 to 10	—	July 17	Not	"	
10	Moulis, André	6	Forearm	July 31	August 6 to 12	Spinal cords of 14 to 5 days.	Sept. 8	Cauterised	"	The death, which happened one month after the inoculations, is said to have been due to pneumonia. The patient was treated by Dr. Yot, at Versailles.
11	Grand, Louis	41	Hand	Sept. 5	Sept. 14 to 28	—	Sept. 8	Cauterised	"	
12	Duresset, Edouard	—	Leg	August	September	—	End of Sept.	?	"	
13	Astier, Justin	2	Both cheeks	August 4	August 5 to 21	—	Sept. 16	Cauterised	"	Convulsive hydrophobia. Incubation, 146 days.
14	Jansen, Louis	47	Legs and fists.	" 18	Aug. 21 to Sept. 3	—	Dec. 31	Not	"	
15	Clergot, Eugène	27	Forearm	" 7	August 11 to 23	New treatment, described on Nov. 2, 1886.	Oct. 24	Not	"	Paralytic hydrophobia. Pain at the points injected.
16	Lodini, Bernard	46	Leg	Oct. 12	October 21 to 31		Nov. 24	Not	"	
17	Leteng, Etienne	59	Foot bitten through slipper.	Nov. 3	November 8 to 20		Dec. 8	Not	"	Paralytic hydrophobia. Pain at points injected, not at part bitten.
18	Née, Leopold	42	Leg bitten through trousers	" 21	November 17 to 26	—	Dec. 17	Not	"	Ditto.
19	Gerard, Amédée	28	Hand	Dec. 1	December 3 to 13	—	Jan. 3, 1887	Not	"	Ditto.
20	Reveillac, Louis	25	"	"	"	—	"	Not	"	Ditto.
21	Rouyer, Arthur	12	"	Oct. 20	Oct. 25 to Nov. 5	—	Nov. 26, 1886	Not	"	Ditto. (According to M. Brouardel, a case of uremia.)
22	Goriot, Paul	12	Forefinger	Sept.	End of December	—	Jan. 14, 1887	Not	Cat	Ditto.
23	Fou up	30	Hand	Dec. 1	December 12 to 22	—	Jan. 24	Not	Dog	Ditto.
24	Alphand	42	"	" 13	Dec. 20 to Jan. 1	—	Jan. 20	Not	"	Ditto.
25	Bergé	40	"	Sept.	September 12 to 24	—	Jan. 28	Not	"	Ditto.

of six, as we all have, of escaping hydrophobia after bites from rabid animals? How could you, a physician, conclude so rashly? How could you imprudently advise M. Pasteur to follow so dangerous a path? How could you, a physician, express yourself as you did when you said: 'Hydrophobia, that terrible malady, against which all remedies have until now failed, has found a cure. M. Pasteur has devised a treatment by which it is possible with certainty to prevent hydrophobia from attacking a person bitten by a rabid animal. I say with certainty, from what I have seen in M. Pasteur's laboratory, because I have no doubt success will be unfailing when the treatment is carried out thoroughly a few days after the rabid bite.' How could you, by such inconsiderate words, run the risk of compromising the Institute, M. Pasteur, and yourself?"

M. Vulpian replied at the Institute on January 24th, and gave the statistical statements, which the Institute immediately sent out all over France. He said: "We have inoculated 3,000 persons: the death-rate from rabid bites was formerly 160 per 1,000. Without M. Pasteur, then, 320 persons would have died in 1886 from hydrophobia; as only 22 died, we have saved 300 lives."

The arithmetic seems correct; but what is no less evident is that, by M. Pasteur's novelty, the number of persons attacked by hydrophobia is suddenly increased to an extraordinary extent. It must be ascertained how many deaths occurred before M. Pasteur. If the number in 1886 is as high as it was before, it follows that the new treatment is without effect.

What was the death-rate before 1885? An eminent professor, Tardieu, found 25 deaths annually during a period of thirteen years. Professor Brouardel lately, during a period of twenty-three years, has found 30 cases yearly. Tardieu said that nearly all the departments

answered his circular. M. Brouardel states that only two-thirds gave him the information he required. Admitting this statement, if 30 is the number of deaths for two-thirds of the departments, 45 will be the number for the whole of France.

Now, in 1886, 39 deaths have occurred. Where, then, are the advantages of the new method?

With regard to the terrible charge brought against M. Pasteur by M. Peter of causing paralytic hydrophobia by his inoculations, M. Vulpian says that the disease is not so rare as is generally believed, and M. Brouardel has recalled one instance spoken of by Van Swieten.

Meanwhile, until M. Vulpian's assertions as to the infallibility of Pasteur's method are confirmed by new facts, I advise my professional brethren to keep to the old method of cauterising the wounds. The statistical accounts prove that out of the 25 fatal cases of hydrophobia in 1886, 3 only had been previously cauterised. This neglect arises from the blind faith in M. Pasteur's treatment which is at present so prevalent.

I may add that nine persons have died during the last two months with strange symptoms of paralysis (paralytic hydrophobia) after having been submitted to the new intensive method. These facts are perfectly conclusive. If M. Pasteur cures hydrophobia, the cure is not a certainty as affirmed by M. Vulpian, and the new intensive method is far from being harmless.

PRESENTATION.—At a public meeting at St. Etienne, France, on March 13th, Dr. Hastings Burroughs was presented with a gold watch in recognition of his services to the McAll French Medical Mission, a branch of which is established in that city.