effect.³ Under these circumstances, according to this theory, we must suppose that one part of the auriculo-ventricular bundle is fibrillating and the other beating.

On March 18th, 1884, I found in the dog's heart, close under the descending branch of the left coronary artery, a nervous bridge, the ligaturing of which immediately destroyed the co-ordination of the beat between auricles and ventricles. The auricles maintained their frequent beat (160 per minute), while the ventricles beat only 40 to the minute. Professor His examined the ligatured bridge and pronounced it to be a nerve bundle and a group of ganglion cells.⁸

In the rabbit Lomakina saw the auricles and ventricles beat quite independently after separate ligations had been made of the aorta and pulmonary artery.⁴ In a dog a ligature applied 4 mm. above the sulcus produced fibrillation of the left auricle, a quickened beat of the right auricle, and a less frequent beat of the ventricles. After loosening the ligature, co-ordination again returned. When the aorta and pulmonary artery were again ligatured, the auricles beat more quickly, the ventricles more seldom. Ligature of the whole heart above the auricles caused these to cease beating, while the ventricles continued. In another dog the right and left auricular appendices were clamped. Both auricles stopped, the ventricles beat. A strong tetanic current upon the left auricular appendix induced 132 beats a minute in the auricles, 104 a minute in the ventricles; strong vagus stimulation, 184 beats in auricles, 80 in ventricles. In a rabbit ligature of the root of the pulmonary artery caused 148 auricular beats, 92 ventricular beats; later 140 auricular to 72 ventricular. Heating the nerve plexus at the base of the great arteries acted even more intensely than ligation; one or both auricles ceased to beat, while the ventricles either continued to beat or fibrillated. After injury or destruction of the plexus situated at the base of the left auricle, we observed entirely different movements of both ventricles to those produced by the ligation experiments. Distant effects were also obtained, for after coagulation of the nerves at the root of the pulmonary artery the base of the left auricular appendix beat before its apex.

Professor Busch (Buffalo) found in the Hallerianum⁵ that the apex of the rabbit's heart no longer pulsated if it were cut away from the ventricular base until connected only by a moderately broad bridge of tissue. The extirpated dog's heart beat if perfused through the left descending coronary artery with blood half diluted with saline. If tetanized it fibrillated only during the period of stimulation. If normal dog's blood were used for the perfusion and the beating heart was then tetanized, the fibrillations became lasting, but could be removed by the perfusion of diluted calf's blood. A strip of ventricle connected to the base by muscle and the coronary vessels beat more seldom than the rest of the heart. If fibrillations were induced in the heart the strip participated, but began to beat when the vessels were ligatured. In one case the bloodless strip fibrillated also.

Dr. Imchanitzky-Ries proved microscopically in 1905 that quickly fixed pieces of the pulsating ventricles showed an equidistant transverse striation everywhere, whereas pieces of the fibrillating heart showed fibres in different stages of contraction.

The phase of contraction, therefore, does not pass beyond the bounds of the fibre. Inside one fibre also the transverse striation can be different.

This discovery proves that the muscle fibres possess no direct functional connexion. As in the beating heart the fibres all show the same phase, the connexion must be independent of the muscle—that is to say, through the nerves.⁶

At Palermo I found with Spaletta in the heart of the turtle a nervous bridge running on the outer side from the auricles to the ventricle. Section of this bridge destroyed co-ordination.⁷ In hibernating animals (rectal temperature of 5° to 8° C.), with the heart beating 12 to the minute, the strongest induction shocks did not produce increase in the rhythm, whereas moderate shocks in the awakened warm-blooded animal would produce fatal fibrillary contractions;⁸ consequently the muscle is not directly excitable.

Paukul in a series of experiments carefully ligatured the auriculo-ventricular bundle (the bundle of His). Microscopic examination confirmed the crushing by the ligature. Nevertheless, the auricles and ventricles con-

tinued to beat with the normal rhythm. Coloured plates of the sections of the bundle have been published. Ligature of the whole heart between auricles and ventricles induced allorhythmia. In one case, too, the introduction of the needle near the bundle without ligaturing produced the same effect. Of this the curves and microscopic evidence have been published.

Cohn and Trendelenburg have cut the auriculo-ventricular bundle in very exact fashion in cats, rabbits, dogs, apes, and goats; they find always that co-ordination was abolished. But these experiments were made not on the living but on the perfused or surviving heart. Langendorf found that perfused cats' hearts will still beat after they are cooled to 6° C. The living dog's heart ceases to beat at 25° C.

It is not necessary to perfuse the coronary arteries of the fibrillating or resting heart with blood to make it pulsate again. Cutting out, as I showed in 1884, suffices; then it pulsates as a whole or in sections either spontaneously or on stimulation.

Our results apply to the living intact heart.

Imchanitzky-Ries found in the lizard (*Lacerta ocellata*) that the chief nervous connexion between auricles and ventricle is situated on the dorsal side exteriorly. It contains also many ganglion cells. Ligature of this plexus destroys the co-ordination of the auricular and ventricular beat.⁹

From these observations it follows that the co-ordination of the different parts of the heart is brought about through a nervous channel. Even if the surmise of Cohn and Trendelenburg were correct, that Paukul had not cut all the fibres of the auriculo-ventricular bundle when he saw the auricles and ventricles beating in co-ordinate fashion, both his observations and ours of the inco-ordinated rhythm induced without any interference with the bundle prove that the auriculo-ventricular bundle is not necessary for co-ordination or does not suffice.

In this paper I have given only the observations made by myself or my collaborators.

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NOTES ON TWENTY-EIGHT CASES OF MONGOLIAN IMBECILES:

WITH SPECIAL REFERENCE TO THEIR OCULAR CONDITION.

BY

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THE following characteristic features were observed in the study of 28 cases of Mongolian imbecility at present resident at Earlswood Asylum. Before discussing them it should be noted that, as judged from 50 consecutive cases, the lives of Mongolians are comparatively short. At Earlswood, the average age at death has been 14 years 7 months for boys, and 14 years 6 months for girls, as judged from 21 consecutive cases. Death was due to the tubercle bacillus in nearly 100 per cent. of the cases. This is clear from the following table:

Cause of Death.	Males.	Females.
Pulmonary tubercle	29	12
General tubercle... ..	8	5
Tabes mesenterica	5	2
Acute miliary tubercle	1	1
Pneumonia	4	—
Bronchopneumonia	1	1
Morbus cordis	1	—
Erysipelas	1	—
	50	21

It is more than probable that the tuberculous element may have been overlooked in some of the cases, as the records go back a considerable time. One case was complicated with status epilepticus, but this is the only mention we have of a Mongolian ever suffering from epilepsy.

The average age of the 20 males at present in residence is 16½, and of the 8 females 13 and 7 months, but of the males 30 per cent. are over 20. This means, we hope, that in the future the average age at death will rise, owing to the better ventilation and steam heating of the present day, and already it is noticed that the chilblains on their hands and feet do not cause so many of them to be kept almost permanently in bed in the infirmary through the winter months.

At a more advanced age the Mongolian seems to be liable to pass away suddenly with acute miliary tubercle; whilst the younger cases contract pulmonary tubercle, and at death general tubercle is found.

MENTAL CHARACTERISTICS.

With regard to education little is to be said; under the most favourable conditions their mental ability is of the lowest order, consequently the most interesting lesson fails to gain their attention. Generally speaking, they are inert, apathetic, give very little trouble, and are quite content to pass their time in an aimless, desultory manner.

Though all Mongolians share the foregoing characteristics, certain among their number are lively in disposition and appear to be altogether more intelligent; but this apparent increase in ability is, with some exceptions, directed more or less to mischievous ends.

Great perseverance on the part of the scholar results in some progress being made in writing, in simple manual occupations, and other work of a mechanical nature.

Imitation is the most strongly marked capability; and this power and love of imitation makes many small children most useful in house work and helping with others, though at school they can be taught nothing.

Almost every one of them is very fond of music, and will beat time correctly all through an hour's performance of the band, and will often imitate the conductor accurately, and be perfectly happy playing imaginary violins, drums, and trombones.

They are most affectionate, and extremely fond of being taken notice of. As a rule they are rarely addicted to the curse of the imbecile, self-abuse, and, if spiteful, seem to do things to the other children for amusement to themselves, and not on purpose to give pain.

PHYSICAL CHARACTERISTICS.

A typical Mongolian has certain well-marked characteristics. The percentages of these characteristics will be given in a small summary at the end of the paper.

He is of short stature, usually under 5 ft., and compared to his height is generally heavier than normal, this being accounted for by the fact that the spine is longer in comparison to the length of the lower extremities.

The shape of the head is usually brachycephalic; the hair is usually scanty, also dry and wiry.

The face is round and has a reddish flush extending from the malar bone to the lower jaw; the lips are transversely fissured and the lower lip sometimes protruded, giving the face the appearance of being underhung. The tongue is markedly fissured (Fig. 2). The mouth is sometimes kept open, but this is generally not the case, as they have usually a well developed posterior nasopharynx. It has been stated that Mongolians always have a contracted posterior nasopharynx; this is not so, and among our cases we have not a single one suffering from post-nasal deafness or aural discharge.

The ears are small, rounded, and devoid of dependent lobes.

The nose has a depressed and broad base to the bridge, and is thus short and squat, generally the nostrils look slightly forward.

The profile is characteristic on account of the usually short and squat nose with ill-defined bridge, thick pursed lips, and tendency to prominence of lower jaw which gives a slightly bulldog aspect to the face, and this must be coupled with the usually poorly developed occipital protuberance (Fig. 1).

An atypical type of case shows the long in contradistinction to the round face, and the dolichocephalic in contradistinction to the brachycephalic head.

The next most characteristic feature is the hands (Figs. 3 and 4); these are "podgy," with short and squat fingers, of which the distal phalanx is nearly as broad as the proximal, and square-ended. The little finger is incurved, and does not reach the last joint of the ring finger, and the skin of the hand is coarse, transverse wrinkles prominent, and sometimes only two well-marked palmar lines are seen.

Another feature is the cleft between the big toe and the rest of the toes (Fig. 5). Knock-knee and flat-foot are almost typical, as is also the very characteristic way of sitting cross-legged like a tailor.

The skin is dry and rough, and sometimes has a downy growth on forehead and nape of neck; the voice also has a distinctive character, a kind of guttural inflection, and a tendency to lalling in which the patients cannot properly pronounce certain consonants—for example, they say "fumb" for "thumb," "yabbitt" for "rabbit," "lellow" for "yellow," "belvet" for "velvet," "tissors" for "scissors."

The teeth, though not showing any originality in shape, are usually badly formed, loosely set in their sockets, irregular in their position, prone to decay, and are generally lost early; the eruption of the teeth seems to take place at the normal periods. The occlusion of the jaws is generally bad; out of 23 cases examined 16 showed inferior protrusion, 5 were practically normal, whilst 2 showed superior protrusion. The typical palate has been well described as "a contracted vault with the sides sloping more steeply in front, so that an anterior plateau is formed, usually rigid in the median line."

OTHER PHENOMENA.

The Mongolian smile is often in great contradistinction

Fig. 1.—To illustrate the rounded head and profile.

Fig. 2.—Case 16. Shows the fissured tongue.

to their usual placid look, and comes and goes instantaneously.

The blood examination of the cases showed:

Red corpuscles	...	...	5,600,000
White corpuscles	...	...	8,300
Percentage of reds	...	...	112
Percentage of haemoglobin	...	...	118
Colour index	...	...	1.05
Differential—			
Small lymphocytes	...	...	30
Large lymphocytes	...	...	6.8
Polymorphonuclears	...	...	56
Eosinophiles	...	...	4
Mast cells	...	...	2.8

The urine showed specific gravity 1018. It was acid, and contained no abnormal constituents.

Fig. 3.—To illustrate the transverse markings of the hand.

The knee-jerk, tendo Achillis jerk, abdominal and cremasteric were normal; ankle clonus and Babinski absent.

In only two cases—one male and one female—were there any congenital heart lesions, and except for bronchitis, no

Fig. 4.—To illustrate the incurved little finger and stumpy hands.

other abnormal physical signs were detected in the others, except one male who has tuberculous glands in both inguinal regions, and one male with tuberculous glands of the neck.

OCULAR CONDITION.

In examining the ocular condition of these children, one is struck at once by the large number who have some eye defect, either squint, nystagmus, ectropion, or defective vision, but so far there has not been noted any constancy in the ocular condition, and we should like to draw atten-

tion to the frequency with which a definite form of cataract is found to be present.

Among our cases, 28 in number, 19 have lens opacities in some form or another, and 18 have a form of cataract of a particular type. This form is seen fully developed in several of the older patients, and it is present in what is probably an earlier, that is, a less mature form, in some of the others, but it is not found under the age of 9 years in any of the patients we have examined.

In the least-marked varieties the opacities consist of small dots in the cortical portion of the lens, deep to the capsule, and nearer the anterior than the posterior surface (Fig. 6, Nos. 5 and 6). These dots are best seen by focal illumination, and are so small that they are invisible when seen by transmitted light. In the mature cases the opacities consist of two layers enclosing a clear nucleus, the posterior lamella being concave forwards, and corresponding in curve with the posterior surface of the lens, the anterior lamella being much flatter and situated about midway between the centre of the nucleus and the anterior surface of the lens. The opacities do not reach to the equator of the lens in any direction. The lamellae consist of dots, numerous, small, and discrete.

The posterior pole of the cataract, which appears to correspond with the posterior pole of the lens, is often marked by a star-shaped opacity. The anterior pole of the cataract, which does not correspond with the anterior pole of the lens, often has a similar opacity to mark its position (Fig. 6, Nos. 3 and 4). The more fully developed might be described as lamellar cataracts, the slighter as congenital "dot" cataracts. Very young Mongolian idiots, however, do not exhibit this change, and the fact that it seems to be better marked in the older cases suggests that it is a late development.

It remains to be seen whether in the cases in which slight opacities are found to-day an increased number of dots appear later, or, in other words, whether the cataract is a progressive as well as a partial one. It is probably a partial and progressive cataract, developed as the result of changes taking place in the lens after its formation.

Though the teeth of these patients are defective they do

Fig. 6.—To illustrate the cataracts. Nos. 1, 2, 3, 5, 6, and 7 are "dot" cataracts with more marked changes at the poles. No. 4 has only a Y-shaped change at anterior and posterior poles. No. 8 is atypical.

not show the "honeycombed" condition found so frequently in cases of lamellar cataract, but the hair and skin show characteristic changes.

We are unable to record accurately the visual acuity of these children, and they are not sufficiently controllable to be entrusted with glasses.

The ectropion found in so many cases is due to a superficial contraction of the skin of the lower lid, which is

Table showing the Ages and Ocular Changes in the Twenty-eight Cases Described.

Number.	Initia's.	Age	Direction of Interpalpebral Fissure.	Nystagmus.	Squint.	Inflammations of Lids.	Epicanthus.	Cataracts.	Remarks.
<i>Males :</i>									
1	A. A.	24	Up and out	Yes	—	Yes	Yes	Yes	Both eyes have well marked lens changes.
2	A. P.	12	Up and out	—	—	—	Yes	Yes	Both eyes have cataracts; slight fundus change.
3	C. J.	14	Up and out	—	—	—	—	Yes	Both eyes hypermetropic astigmatic.
4	H. S.	14	Up and out	—	—	—	Yes	Yes	Both eyes cataractous.
5	G. J.	20	Up and out	Yes	—	—	Yes	Yes	Both eyes cataractous.
6	D. B.	9	Up and out	—	Yes	Yes, ectropion	—	Yes	Both eyes Y-shaped, slight; left eye defective vision.
7	A. R.	23	—	—	Yes	—	—	Yes	Corneal opacity left eye.
8	P. J.	21	—	—	—	—	—	Yes	Very fine.
9	C. W.	21	—	—	—	—	—	Yes	Right eye, typical; left eye, iritis; synchiae and cataract.
10	W. W.	14	—	—	—	Ectropion	—	Yes	Myopic changes in fundus. Left eye, complete cataract, with iritis.
11	F. K.	14	Up and out	—	—	Yes; ectropion	—	Yes	Slight, both eyes.
12	B. S.	18	—	—	—	Yes	—	Yes	Both eyes cataractous.
13	T. W.	11	—	—	—	Yes	—	Yes	One eye only—right eye.
14	H. T.	16	—	—	Yes	Yes	—	—	Disseminated choroiditis both eyes.
15	R. O.	30	—	—	—	—	—	—	No changes.
16	S. L.	43	Up and out	—	—	Yes	—	Yes	Well marked changes in lenses.
17	L. P.	12	Up and out	—	Yes	—	—	Yes	One eye only—right eye.
18	B. A.	8	Up and out	—	Yes	—	—	—	No change.
19	M. G.	5	Up and out	—	Yes	—	—	—	No change.
20	C. B.	15	—	—	—	—	—	—	Hypermetropic astigmatism, normal.
<i>Females :</i>									
21	E. B.	17	—	—	—	Yes	—	Yes	Both eyes cataractous.
22	E. H.	12	Up and out	—	—	—	—	—	Has patches of choroidal atrophy at each macula.
23	G. H.	9	—	—	—	—	Yes	Yes	One eye. Right eye, hard, atypical.
24	W. C.	13	—	—	—	—	—	—	Quite normal.
25	C. D.	31	—	—	—	—	—	Yes	Old iritis and cyclitis, both eyes.
26	G. N.	6	Up and out	—	Yes	—	Yes	—	No changes in lenses.
27	F. R.	22	—	—	—	Yes	—	Yes	Fine fringe of opacities at equator.
28	E. D.	11	Up and out	—	—	—	—	—	Hypermetropic astigmatism.

Table showing the Percentage Occurrence of the Characteristics Noted in the Twenty-eight Cases Described.

	Males.	Females.		Males.	Females.
Tongue sucking ...	30	0	Hands typical ...	85	62.5
Tongue protruded ...	5	12.5	Incurving of little finger ...	25	50
Tongue fissured ...	90	75	Little finger does not reach last joint of third ...	80	100
Enlargement of papillae ...	70	75	Ulnar deviation of hand ...	30	62.5
Mouth kept open ...	65	75	Thumbs small ...	35	37.5
Lips transversely fissured ...	35	62.5	Three lines on hand ...	85	100
Lower lip protruded ...	30	25	Hyperextension of fingers ...	95	100
Ears small and round ...	60	75	Knock-knee ...	65	100
Of simple type ...	85	87.5	Flat foot ...	65	75
If devoid of pendent lobes ...	55	75	Cleft toe ...	70	62.5
Nose short and squat ...	75	62	Hyperextension of knee ...	50	50
Nostrils look slightly forwards ...	55	37.5	Skin dry and rough ...	80	100
Flush on cheeks ...	55	85.5	Skin covered with fine hairs ...	40	12.5
Face round ...	50	62.5	Extremities cold ...	75	100
Face depressed as a whole ...	15	12.5	Nasal catarrh ...	65	62
Lower part of forehead on plane posterior to upper	15	0	Bronchitis ...	49	62.5
Occiput in direct line with neck ...	45	37.5	Cracked lips ...	60	50
Profile characteristic ...	90	85.5	Lalling ...	50	? (only a few will talk to order)
Adenoids ...	45		Deep reflexes normal ...	100	100
Posterior nares contracted ...	40		Sits cross-legged ...	90	100

rough, glazed, and dry, and the marginal blepharitis is probably in the first instance the result of infection from the hands, which are frequently used to rub the eyes with, and is kept up by the ectropion, error of refraction, and dirty habits of the patient.

The number of patients examined was 28, corresponding to 56 eyes.

	Per cent.
19 patients have lens changes ...	67.8
18 patients have typical lens changes ...	64.3
35 eyes have cataract changes of some sort ...	62.5
33 eyes have typical changes in the lens ...	58.9
10 patients have some inflammation of the lids	35.7
7 patients have squint	
4 patients have choroidal changes	
2 patients have nystagmus.	

The age of the youngest patient is 5 years and the oldest is 43.

The youngest showing cataract is aged 9, and the oldest patient has a well-developed typical cataract of the kind described.

Fourteen patients have the interpalpebral fissure directed upwards and outwards.

We wish, in conclusion, to offer our best thanks to Dr. Caldecott, the Medical Superintendent of Earlswood Asylum, who has given us every facility for investigating these cases.

SOME EXAMPLES ILLUSTRATING CASES OF CHRONIC TOXAEMIA AT VITTEL.

BY

H. J. JOHNSTON-LAVIS, M.D., D.Ch., M.R.C.S., ETC.

PERHAPS in the whole history of the growth of a spa or hydro-mineral station none can compare with the remarkable rapidity with which Vittel has jumped into fame. Ten years since it was known to comparatively few physicians, and ranked as a fourth or fifth rate station so far as its resources and number of visitors were concerned. It now stands in the very first rank.

I have practised there seven seasons, and done two cures there myself annually, and may, therefore, claim to speak with some experience. I propose to select a few of my cases from one season's (1909) practice, and to point out the results as an illustration of the beneficent action of the cure in somewhat varied ailments. The cases of "physiological disequilibrium" and ailments that are relieved by Vittel treatment, of however varied facies, may all be summed up as the result of *chronic toxaemias* due to either perverted nutrition, defective metabolism, or incomplete elimination. This condition, which we English physicians denominate as "goutiness" and the French medical man as *arthritique*, is ill expressed by such terminology. All originate in an excess of one or more of the normal constituents of the blood or the presence of abnormal ones. When we look at these different disturbances of the physiological balance we shall all the more clearly appreciate the close association of many different ailments. We shall also be able to comprehend how a cure such as Vittel is one of the most effective and rational methods of restoring *physiological equilibrium*.

Who can draw the border line between acute and chronic gout, calculosis, some forms of nephritis, arteriosclerosis, neurasthenia, asthma, chronic bronchitis, some dyspepsias and enterocolitis, many skin diseases, neuritis, some rheumatisms, etc.?

When I have at other times sustained this thesis, critics have held me up to ridicule. My answer has been, Think over it, and tell me why we so often find several such states associated in the same individual at once or alternating with each other, and why the same cure with suitable modifications is so efficacious in relieving or curing these troubles.

All the analyses are of the entire and carefully collected quantity of twenty-four hours. They are made in my own private laboratory, fitted with the most modern and approved apparatus by my analyst, Dr. Burrais, of the Pasteur Institute. He knows nothing of the cases, and is therefore quite free from any personal equation modifying the result. All the results are calculated on the personal equation of each individual based on weight, height, and

age. Where extraordinary results are obtained, both of us repeat the determination. All calculations are based on the personal coefficient. I have much pleasure in thanking him for his valuable and skilful assistance.

J. M., a highland chief, aged 58, 6 ft., weight 77 kilos, sent by the late Dr. Radcliffe Crocker. Has suffered for years from eczema on neck, fingers, toes, and fork of legs. He complained of feeling stiff in his movements, lacking energy, and always tired. Has also patches of psoriasis on knees. Two fingers and one toe suppurating around nails, the region of which is red, swollen, and angry. There is no syphilitic history. The son is a fine specimen of an officer in the Guards, wife in good health. Patient has always been temperate, has fairly good digestion, but takes an aperient every morning, "which keeps him all right." His skin acts freely. He is a strong, otherwise healthy man. He has been twice to Homburg, and three times to Schinznach, with little benefit.

On July 18th, day after arrival, had a mean blood pressure of 135 mm. His urine is represented in the following diagram, which is remarkable by the enormous amount of solids, com-

J. M., July 20th, 1909.

Traces of some reducing material (? glucose). Slight traces of true and modified biliary pigments and of scatol. Abundant deposit of urates and some pavement epithelium. Purins 0.518 per 24 hours.

August 9th, 1909.

True biliary pigments in traces, as also faint reaction of scatol. Urates and cells much less. Purins 0.689 per 24 hours.

posed of all the elements of the urine, but specially chlorides, which were 75 per cent. in excess. His urea-uric acid coefficient is sensibly normal, but both are increased nearly thirty per cent. above what they should be.

After a few days he was drinking 1,800 c.cm. of Grand Source before breakfast, and 900 c.cm. in the afternoon. The skin was kept active with baths at 36° C., and a low semivegetarian diet ordered, excluding salt as much as possible.

Another twenty-four hour urine analysis, made on August 9th, one day after the cure was stopped, shows a remarkable change. The curve has the same general form, but approaches quite near to the normal line. Solids have fallen from 204 to 125 per cent., acidity from 144 to 110 per cent., urea from 128 to 90 per cent., uric acid and chlorides to normal, and phosphates to 9 per cent. below normal.

Simultaneously with this all his feelings of stiffness, loss of energy, etc., have disappeared, and all his skin lesions are rapidly healing.

I think we have here a case of excessive assimilation which led up to a state of autointoxication in which the skin was most affected, but he was on the verge of an outbreak of joint, muscular, and nervous trouble.

The lixiviating effect of a rapidly absorbable and rapidly excretable non-chloride-bearing waters is striking.

The purin bodies as a whole seem to have increased at the end of the cure. Whether we can interpret this as increased production or increased excretion of a retained stock could only be determined by ulterior analyses, which unfortunately could not be obtained.

The following three cases I have chosen because they consist of father, mother, and adult daughter living under sensibly the same conditions, and furthermore that, as they enjoyed Vittel so much, they stopped on for some weeks after their cure, and the second urine analysis was made at a considerable interval after their "cures" had stopped. These are rare opportunities, and I think worthy of study.

Dr. Curgenvén, who sent them to me, says:

"Mr. S. had an attack of cardiac weakness and irregularity about two years ago—a very irregular pulse, high arterial tension, a tendency to dyspnoea, and a dilated stomach; this was caused, I think, by living at too high a pressure, and too