two years, we desire to call particular attention to the grading we have been led to adopt in accordance with nature of work. Expressed in terms of cubic centimetres CO₂ exhaled per second (gross) and of the approximate caloric expenditure thereby signified, our grading is as follows:

	C.cm. CO ₂ per Second.	Calories per Hour.
I. Sedentary work	Below 5	Below 100
II. Light... ..	5 to 10	100 to 200
III. Medium	10 to 15	200 to 300
IV. Heavy	15 to 20	300 to 400
(Heaviest)	(Above 20)	(Above 400)

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INTERMITTENT ALBUMINURIA IN CHILDREN.

BY

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By the term intermittent albuminuria is meant the condition in which a specimen of urine passed at one time of day is found to contain albumin, whereas a specimen from the same patient at another time of day is free from it. This condition is well known, and has been called by several names, of which cyclic, postural, orthostatic, lordotic, functional, and physiological are the commonest. Albuminuria is present only if the patient is up and about, and is absent if he remains in bed.

Etiology and Pathology.

Albuminuria is much more common in children than is generally supposed.

Samuel West¹ quotes the following figures for boys between 10 and 18 years of age:

Author.	Number Tested.	Percentage with Albuminuria.
Stirling	369	20.8
Ribbert	240	22.0
Dukes	Many years' experience	22 at least
Grainger Stewart... ..	100	17.0

Stirling also shows that the incidence increases from the age of 12 to 15, and then decreases. Leslie Thorne Thorne² states that out of 1,890 boys between 9 and 16 years 9.1 per cent. had albuminuria; of these only fifteen (or 0.8 per cent.) had definitely hypertrophied hearts and increased arterial tension.

On examining the urine of 397 boys between 8 and 14 years of age at Vauxhall Street Elementary School I found albumin in 91 of the specimens (that is, 23 per cent.). The tests were carried out between 10 and 12 o'clock in the morning, the method employed being to add four drops of a concentrated solution of salicyl sulphonic acid to half an inch of urine in a test tube. The following table gives the age incidence in this series; no attempt was made to discover how many of these cases were intermittent.

Age	...	8	9	10	11	12	13	14
No. of cases	...	82	63	65	54	63	62	8
Percentage with albuminuria	...	12.5	17	22.5	24.5	31	39	50

With regard to sex incidence, it is generally assumed that albuminuria is commoner in boys, but there does not seem to be any evidence on the subject; out of 16 cases of intermittent albuminuria studied at the Evelina Hospital

for Children, only 4 were boys. In regard to age, the youngest case I have seen was a girl of 5½; the condition is said to be very rare after 20.

Most authors agree that children with intermittent albuminuria are debilitated, and some French physicians³ ascribe the condition to "pretuberculosis." Others lay stress upon the presence of lordosis in these cases, and Jelle⁴ goes so far as to say that he can produce albuminuria in normal children or prevent it in orthostatic children by mechanical means. In 6 cases in which I made special note of the spinal curvature, lordosis was present in 4 and absent in 2.

As intermittent albuminuria is not a fatal disease very few accounts of *post-mortem* findings have been published. Langstein⁵ describes a case of orthostatic albuminuria, which died of cerebral tumour, in which no abnormality was found in the kidneys either macroscopically or microscopically.

Several theories have been advanced to account for this condition, but each of them has the disadvantage of not explaining all the cases; the following are some of the best known:

1. That it is due to congestion of the kidneys, either by pressure on the renal veins or from some vasomotor abnormality.
2. That it is due to diminished coagulability of the blood, and is related to chilblains and urticaria, and may be cured by administration of calcium lactate for a few days.
3. That it is an early manifestation of tuberculosis.
4. That it is one of the neuroses of childhood.

Character of the Urine.

The amount of urine passed in two cases admitted as in-patients to the Evelina Hospital was found to be normal, more being secreted by day than by night.

The specific gravity varies between wide limits in individual cases. The albumin also varies in amount, but is seldom more than 0.05 per cent. by Esbach's method. It is generally absent from the morning specimen, and absent if the patient remains in bed; but in one of the cases treated as an in-patient a cloud of albumin was present in the morning specimen on one occasion, and the child had a temperature of 100° the same evening, for which no cause could be found; neither the morning albuminuria nor the pyrexia recurred. The other case admitted to hospital developed a very severe attack of gastro-enteritis, passing blood in the stools; one of the specimens obtained during this illness contained albumin although the patient was in bed. In patients who are up and about the amount of albumin increases to a maximum during the day, the time at which this is reached being constant in any individual case, so that one child would always have a trace at midday and a cloud in the evening, whilst another would always have a cloud at midday and none in the evening. In some cases a precipitate is formed in the cold by adding a few drops of acetic acid to the urine; some authors state that this is pathognomonic of intermittent albuminuria, but it is not present in all cases, and is sometimes found in other conditions such as cyclic vomiting and cardiac failure of diphtheria. The formation of this precipitate is slow, so in all probability it is often overlooked. Probably more than one substance is precipitated in this way, for in most specimens the cloud thus formed is increased by boiling, but in a few cases it disappeared on heating to re-form very slowly after cooling.

Casts are sometimes found in cases that appear to be simple intermittent albuminuria; hyaline types are commonest, although granular and epithelial are sometimes seen. Out of nineteen specimens of urine containing albumin from boys at Vauxhall Street School epithelial casts were found in one specimen, granular in four, and hyaline in one. Blood was not found in any of these cases, nor in any of those seen at Evelina Hospital.

Symptoms and Signs.

There can be no doubt that many cases occur without symptoms. There does, however, seem to be a syndrome associated with intermittent albuminuria which is quite characteristic but difficult to describe. Heubner says: "There is considerable atony and lassitude, which deprive these children of all joyfulness, alacrity, and pleasure of work." The patient generally cries when examined, and whimpers or "grizzles" a great deal at home; he is easily tired, and prefers sitting down to playing about. These children are subject to headaches and "bilious attacks," but are not constipated; they sleep well, and do not want to get up in the morning.

The children are asthenic and their pupils are unusually large; beyond this nothing was constantly found among the 16 cases at Evelina Hospital. The heart was enlarged in 2 cases only and the exercise tolerance was normal in

the 4 cases which were tested. The lungs presented abnormal signs in 6 cases, but none of these could be labelled phthisis; cough was not complained of. The blood pressure was found to be high in some cases—for instance, 140 mm.—and low in others, and the same may be said of the pulse pressure. Retinitis was not present in any case. Some of the children were pale but others had rosy cheeks. In most cases albuminuria was the only abnormality.

Renal Efficiency Tests.

The urea concentration test was carried out on 7 patients; this test, described by MacLean,⁵ consists of giving urea by mouth and estimating its concentration in the urine one and two hours later.

In every case the renal efficiency was normal, both when albumin was present and when it was absent. The following tables give the results in detail:

Patient.	Date.	Time.	Amount of Urine.	Albu- min.	Urea percent- age.
V. W., aged 8. In bed. 10 grams urea given in 2 oz. water at 10 a.m.	1920. Oct. 13	10 a.m.	c.cm. —	0	1.1
	"	11 a.m.	113	0	2.5
	"	12 noon	78	0	3.1
Same patient up; bed at 5 p.m. Same dose of urea at 4 p.m.	Oct. 22	4 p.m.	—	+	1.0
	"	5 p.m.	31	++	2.8
	"	6 p.m.	40	+	3.6
B. L., aged 9. 10 grams urea given at 2 p.m. Patient up and about.	Oct. 14	Morning	—	0	2.9
	"	2 p.m.	—	±	1.75
	"	3 p.m.	51	±	3.0
	"	4 p.m.	40	+	4.5
D. R., aged 6. 7.5 grams urea at 10 a.m. Patient up and about.	Oct. 25	10 a.m.	—	±	0.3
	"	11 a.m.	173	0	0.8
	"	12 noon	53	0	2.25
E. L., aged 9. 10 grams urea at 10.15 a.m. Patient up and about.	Oct. 23	10.15 a.m.	—	+	1.2
	"	12.15 p.m.	—	+	2.35
P. L., aged 13. 10 grams urea at 11 a.m. Patient up and about.	Oct. 27	Morning	—	0	1.1
	"	11 a.m.	—	+	2.3
	"	12 noon	46	+	2.8
	"	1 p.m.	33	0	3.8
H. H., aged 11. 10 grams urea at 3.5 p.m. Patient up and about.	Oct. 15	3.5 p.m.	—	+	1.6
	"	4.5 p.m.	16	±	1.95
	"	5.5 p.m.	62	0	2.65
D. B., aged 15½. 5 grams urea at 9.45 a.m. Patient up and about.	Nov. 3	Morning	—	0	3.35
	"	9.45 a.m.	—	+	0.6
	"	10.45 a.m.	65	0	1.2
	"	11.45 a.m.	24	±	2.85
M. H., aged 6. 5 grams urea at 10 a.m. Patient up and about.	Oct. 13	10 a.m.	—	+	0.7
	"	11 a.m.	51	++	1.5
	"	12 noon	33	++	2.0

The following results in a case of chronic nephritis are given for comparison with the above. It will be seen that the kidneys are unable to concentrate urea to more than 1.1 per cent.

Patient.	Date.	Time.	Amount of Urine.	Albu- min.	Urea percent- age.
D. R., aged 5½. In bed. 7.5 grams urea at 11.30 a.m. and 12.50 p.m.	1920. Oct. 14	11.30 a.m.	c.cm. —	0.05 %	1.0
	"	12.30 p.m.	85	++	1.1
	"	1.30 p.m.	85	++	0.75
	Oct. 25	12.50 p.m.	—	++	0.8
	"	1.50 p.m.	71	++	0.7
	"	2.50 p.m.	64	++	0.7

The blood urea test was not performed.

Diagnosis.

In children, as in adults, albuminuria is only one sign of nephritis. Intermittent albuminuria is scarcely likely to be mistaken for acute nephritis, for the amount of urine passed in the former is not diminished; it contains few, if any, casts and no blood, and there is no oedema; moreover, albumin is absent from the specimen passed on rising in the morning. The same features differentiate it from the hydraemic type of chronic nephritis (chronic parenchymatous nephritis). From the azotaemic type (chronic interstitial nephritis) it is distinguished by the fact that the amount of urine is increased and its specific gravity is low in the latter; also the cardio-vascular system may show changes and retinitis may be present. The urea concentration test gives normal values—that is, above 1.5 per cent. in the second hour—in intermittent albuminuria, whereas the figure is low in interstitial nephritis. It is said that during convalescence from acute nephritis albuminuria may be intermittent or orthostatic in type. Langdon Brown says that intermittent albuminuria may be differentiated from chronic nephritis by the fact that the administration of calcium lactate will check the former; this drug was tried in two cases, but had no effect. The albuminuria which occurs after violent exercise need not be discussed here.

Prognosis.

The prognosis seems to be largely a matter of personal opinion. Thus Taylor observes that bank clerks with orthostatic albuminuria are more often on sick leave than those without. Langstein sums up by saying, "There is a certain degree of inferiority in individuals affected with orthostatic albuminuria . . . as is illustrated by the fact that they are frequently a prey to tuberculosis." On the other hand, Clement Dukes,⁶ whose observations cover a long period, does not consider the outlook at all gloomy.

Conclusions.

1. Intermittent albuminuria is a common condition amongst children.

2. It is not a form of kidney disease.

3. It is called by so many different names, and there are so many theories about it that it is probably not a specific morbid entity, but a symptom of several diseases.

I am indebted to Dr. Boome for permission to publish the figures from Vauxhall Street School, and to the Headmaster, Mr. J. J. Thompson, for allowing me to test his boys and for the personal assistance he rendered in collecting the specimens.

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Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

AN UNUSUALLY VIRULENT VARIETY OF MICROSPORON.

A boy, aged 13, had ringworm patches on the scalp, face and neck in July, 1917. Mycelium was found in scales, and the microsporon collar on hairs. A younger brother soon acquired the disease in multiple patches. Cultures were readily obtained of the same organism in both.

Macroscopic: On wort agar at summer room temperature it forms a round pinkish colony elevated towards the centre where there is a dimple from which numerous fine ridges radiate outwards like the gills of a mushroom. In about a week the surface shows numerous spiky projections which gradually develop white tufted summits like sheaves of corn.

On potato the culture is snow-white and furry without ridges or red colour. On neutral malt extract gelatine growth is as on potato with liquefaction in fourteen days. Though growth is coarser on wort agar, the same elements are found on all three.

Microscopic: Mycelium distinct, branching and septate, colourless; in a seventy hours' culture the larger hyphae (2 to 3 μ) often show pyriform swelling at the septa; in older cultures some hyphae show multiple septation into oidium-like elements (pseudoconidia). The snow-white surface of culture consists of fertile aerial hyphae, many of them fasciculated into spiky projections, which branch near the tip to bear conidia. The conidiophores carry numerous colourless rounded conidia, 2 to 3 μ in diameter, unicellular, solitary, terminal, with a facet of articulation when detached. In hanging drop these readily