vessels, chronic renal disease, and in all forms of albuminuria. This physiological study so far seems to support this clinical experience. In anæmia, perhaps the ingestion of more fluid will prevent the fall of the blood decimal. It is easy to understand how cases of cardiac incompetency may be severely tried by the rarefied and dry air of high altitudes, for the friction-coefficient of the blood will be increased by the polycythæmia, and the deeper breathing will tend to maintain heart hurry and over-incitement of the weakened heart may be maintained by the increased respiration. But inasmuch as the breathing of rarefied air seems to lead to filling of the arteries and reduction of the veins, it is quite conceivable that if applied *gradatim* in suitable cardiac cases, it might prove to be of considerable therapeutic value. Physiology and pathology likewise join hands in regarding cases of chronic interstitial nephritis as unsuitable for treatment by the mountain cure, for in that disease polycythæmia and high arterial tension are prominent pathological conditions.

Undoubtedly this physiological mode of treatment by mountain air is very decisive in character. It is certainly of the highest value in phthisis.

VI.—BATHS.

Hot and cold baths, whether local (as hand baths) or general, produce contrary effects on the blood, the former lowering the percentage of the corpuscles and hæmoglobin, and the latter raising them. The fall from a warm bath of 15 minutes' duration may be 7 per cent., and the rise from a short immersion (3 minutes) in cold water may be 4 per cent. The alteration is merely a disturbance of the relation between the corpuscles and the plasma, for the blood decimal remains unaffected. It would, therefore, seem that temperature, which is the predominant influence in bathing, alters the composition of the blood by retarding or accelerating the rapidity of fluid transfer through the capillary wall, warmth slackening it and probably favouring the lodgment of tissue lymph, and cold stimulating it. In all probability this influence is mainly exerted through the effect of warmth and cold on the intracapillary pressure.

VII.—OXYGEN INHALATION AND ETHER ANÆSTHESIA.

The inhalation of oxygen in rabbits produces, as a rule, a concurrent rise in the corpuscles and hæmoglobin. Probably this result arises from the increased arterial and consequent intracapillary pressure caused by oxygen.

It having been stated during the past year that ether anæsthesia, particularly in anæmic subjects, produces a rapid and marked diminution of the hæmoglobin,¹⁴ it seemed desirable to make some observations on animals in order to ascertain if the normal red corpuscle is affected by ether, especially as observations on the effects of anæsthetics on the blood made before, during, and after operations are unreliable, because these themselves, whether producing loss of blood or not, profoundly disturb the composition of the blood.

In a series of 6 experiments on rabbits, in which 18 observations were made during the profound ether anæsthesia of one hour, the average blood decimal was 1.01 before and 0.98 during the administration. The corpuscles examined during the anæsthesia were normal in appearance. No obvious after-effects were observed.

From this too limited number of observations it would seem that ether anæsthesia does not produce a very pronounced effect on the normal red corpuscles. But it should not be inferred that it will be equally harmless when the corpuscle is abnormal, as in anæmia. There is some ground for believing that the stroma varies in its resistance to the same chemical agent: for example, it has been observed that the corpuscles of different subjects vanish at different rates when mixed with the same solution of sodium chloride in the same proportion and exposed to the same temperature.¹⁵

VIII.—VARIATIONS IN THE PLASMA AND THE CIRCULATION OF WATER.

The concurrent variations in the percentages of the corpuscles and hæmoglobin which have been so repeatedly pointed out are indeed volumetric indications of the circula-

tion of water into or from the blood—into it from the digestive tract and the tissues, and from it by the kidneys, skin, and lungs, and probably into the muscles during exercise. The blood is continually tending to balance its income and output of water, but variations in the proportion of water present in the plasma are constantly taking place within certain physiological limits. When, for example, the output of water, whether by the kidneys, skin, or bowels, temporarily exceeds the income, the volume of the plasma is for the time reduced and there is a proportionate rise in the corpuscles. All such transitory phases of concentration of the corpuscles can only be due to the shrinking of the plasma from loss of water.

Clinical observation during last summer also indicated that persistent deviations are to be met with on one or the other side of the physiological mean percentage of the hæmocytes. For example, polycythæmia was frequently observed in chronic interstitial nephritis with high arterial tension, in diabetes mellitus, in chronic gout with increased arterial tension, and in those disposed to hæmorrhage (epistaxis, etc.). At present I refer to this matter merely in general terms, for further observation is necessary in order to test these preliminary conclusions.

When the arterial tension is raised by any means, such as by small doses of suprarenal extract, by tonics generally, and even by mere change of air and scene and by recreation, the corpuscles will, as a rule, rise considerably; but it does not follow that the rise is necessarily and entirely due to the formation of chromocytes, for the major part of it probably arises from accelerated transfer of water from the blood as the result of increased intracapillary pressure. Even in anæmia the blood may become apoplasmic. The pathogenic cause is not always obvious; it may, however, be frequently traced to a reduced ingestion of water and occasionally to the increased elimination of it, probably under neurotic influence. In such cases the volume of the blood is obviously reduced, the percentage of the corpuscles is absolutely either normal or in excess, and that of the hæmoglobin—though it may be absolutely in excess—is always relatively subnormal, and improvement is indicated by a fall in the absolute percentages and a rise in the blood decimal. On the other hand, the reduced elimination of water, as when the blood pressure is much diminished, tends to lower the percentages of the corpuscles and hæmoglobin.

CONCLUSION.

In conclusion, it is perhaps superfluous to point out that, according to the data which have been advanced in these lectures, it would seem that in health the composition of the blood varies quite as much as the calibre of the arteries, and that the variations in the former are largely influenced by the forces of the circulation; in a word, that the physiological relationship that subsists between the blood and the circulatory apparatus is as intimate as is the anatomical.

A GOÏTROUS CRETIN UNDER THYROID EXTRACT.

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In the English Lake district lies a valley, running from west to east, and open only on the eastern side. At the bottom of the valley runs a stream in a fairly straight course from west to east, and widening out in one spot into a tarn, 340 feet above sea level. The valley is bounded both north and south by hills upwards of 1,000 feet high, and south-west, west, and north-west by a range upwards of 2,000 feet in height. The valley and adjacent hills are formed out of Borrowdale volcanic rocks, the only other neighbouring formation being an overlying narrow belt of Conistone limestone nearer the eastern outlet of the valley. Both parents of our patient had lived since birth in this valley, the father at the bottom, close to the tarn, the mother 80 or 100 feet higher up the southern slope.

The patient, Lizzie P., was born on November 20th, 1877, in the bottom of the valley, near the tarn; two years afterwards the family migrated to a house on a level with that of the

¹⁴ The Blood Alterations in Ether Anæsthesia. By J. Chalmers de Costa. Philadelphia Medical News, 1895, vol. i. p. 225.

¹⁵ The effects of chloroform on the red corpuscle have not been sufficiently observed to warrant any statement of results.

mother's family on the southern slope; and here they have resided ever since. No other cretins are known in the district; but the mother had goitre in 1870, and a neighbouring family presents three instances of this same complaint. The patient's mother, when three months pregnant with her, experienced a great shock from the wounding of the neck of one of her older girls by the accidental firing of a gun. The four grandparents, and at least five of the eight great grandparents, had lived to a good age. No consanguinity is known to have occurred. The drinking water was pure and soft, from the adjoining slate rocks, but was doubtless freely contaminated with iron pyrites which abounded near the slate.

As an infant the patient was quite unlike other children, for she lay nearly always still and quiet, "almost lifeless," and rarely cried; she was pale, always cold and starved; her

speak. Her head was very large, with a prominent ridge in the occipital region. Her hair was coarse and sparse, and the scalp scurfy. There was great swelling of the face, lips, and tongue; the face was pale and dirty looking, the lips livid, the tongue livid and protruding. The bridge of the nose was very depressed, the tip upturned, and the bones of the bridge absent, so that the entire nose could be pushed in like india-rubber. The neck was very baggy and much swollen, especially under the chin and above the collar bones; and between the supraclavicular baggy masses there was a large goitre, of which the left lobe was much bigger than the right. A soft baggy mass existed also outside each nipple. There was marked lordosis, with corresponding protrusion of the belly, and an umbilical hernia the size of a walnut. The skin was very loose and dry, and had been never known to sweat. She was always cold, liked to be near the fire, and had ugly scars on the hands from burns caused thereby. The milk teeth

Fig. 1.—Photographed March, 1884.

skin was rough like goose flesh, and she had baggy swellings over the collar bones. She could say a few words like "mam" and "dad" when about a year old, but never got any further, and soon lost the power of saying even that. When 2 years of age she had whooping-cough, in which she never coughed like any other child. She never offered to walk, and could not even sit up till aged 6 or 7 years. She was very fond of listening to music, and showed much annoyance at discords. In March, 1884, she was photographed, when aged 6½ years. At 8 years of age she had measles, and about four or five years later a goitre appeared, which only grew to a considerable size when she was aged 17. She was photographed again on October 13th, 1895, when nearly 18 years of age.

At this time she was so stunted as to be easily mistaken for a child aged 2 or 3 years; she could not stand or walk or

Fig. 2.—Photographed October 13th, 1895.

were still present, mostly black and stumpy; but two lower central permanent incisors had recently appeared. She was always very costive, the bowels being usually moved only once a week. She weighed 36½ lbs., and measured 33 inches in length.

On October 15th she began taking half of a 5-grain thyroid tabloid daily, and within the first week she became much brighter and quicker in noticing things; she also lost 1½ lb., and said "mam," "dad," and "bab" for the first time for many years. During the second week she lost 2 lbs. more, but was made very ill, hot, feverish, restless, parched, thirsty, and apparently full of pain by giving her on two or three occasions the whole of a 5-grain tabloid in one day. During the third week she lost 1½ lb. more, and became still brighter and quicker in taking notice of everything; also the goitre was obviously smaller, the face and lips were less swollen, and the tongue was often kept inside the mouth;

for the first time in her life she often became frightened at things. By the end of the fourth week she had dropped to 29 lbs., after which she regained 3 lbs., and remained at 32 lbs. for several consecutive weeks. By the end of the fifth week the tongue seemed nearly normal in size and shape. The dose was then increased to three-quarters of a tabloid daily, and by the end of the seventh week she had grown $1\frac{1}{2}$ in., and could clearly understand much better what was said to her. During December and January she took a 5-grain tabloid daily, and by the end of that time she could stand upright. Throughout February she took $1\frac{1}{2}$ tabloid daily, and by the end of that month her hair was rapidly falling out, and a new short crop taking its place. She would laugh and become quite frolicsome; she could walk about the house with a little support, but her hands began to tremble in handling food, so that she could not raise a cup properly to her mouth. Two upper central incisors had appeared. She now stopped speaking for many weeks, although throughout March she continued taking $1\frac{1}{2}$ tabloid daily.

Fig. 3.—Photographed April 5th, 1896.

On April 5th, 1896, she was again photographed, this time with very great difficulty, as she was now full of life and activity, never still for an instant, laughing or crying according to her mood. Her head had become much smaller, better shaped, and the occipital prominence had disappeared. All her long hair had fallen out, except a small tuft on each side, which was cut so as to be uniform with the new short crop; the scalp was no longer dry or scurfy. The nose was not much improved, there being very little perceptible bone, so that the whole organ could still be pressed in like indiarubber, while the bridge was still depressed. The lips were thinner and less livid, but still gaping; the tongue much smaller, but still often protruding. Most of the old teeth were still present, but two upper central incisors had come through, and many other teeth seemed to be budding on the inner side of the old stumps. She had recently coughed quite naturally for the

first time in her life. The neck was very much thinner, the submental bagginess had gone, the supraclavicular masses were much less, and the goitre greatly reduced, especially the right lobe, which was now quite small, though the left half protruded more conspicuously than ever as a spherical mass. The extra-mammary baggy swellings had gone. The lordosis, prominence of belly, and hernia had disappeared, and the child now stood erect. The skin was still dry and loose, and itched so much that she was continually scratching herself. She was much warmer, and no longer hugged the fire. She could stand and walk with slight support. Her bowels were quite regular. She had grown $3\frac{1}{2}$ inches since the treatment began. She noticed, watched, understood far more; and laughed and cried vigorously. She had every appearance of enjoying life immensely.

This case is particularly interesting on account of the rarity of goitrous, as compared with non-goitrous, cretinism in this country; also as contravening Bourneville's statement that goitrous cretins have no pseudo-lipomata, and as an instance of the inutility of dividing cretins into an endemic and a sporadic class. Though the benefit to be expected from thyroid extract cannot equal that noted in younger children, both the physical and mental improvement during the first six months have been very considerable, and there is every reason to be confident that a much greater development is still in store for the patient.

NOTES ON THE DIAGNOSIS OF LATENT ABSCESS OF THE MAXILLARY ANTRUM.

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THE cases to which these notes are intended to refer are those in which the pus escapes through the normal orifice (or orifices) of the antrum into the nasal cavity, and are characterised chiefly by a history of purulent discharge from the front or back of the nose, mostly unilateral and generally more or less fetid, and often by pain in the infra- and supra-orbital regions.

The objective signs of this disease may be divided into those which render its presence probable and those which are pathognomonic.

A. The probable signs are:

1. *The Rhinoscopic Appearances (Anterior and Posterior).*—

These include the absence of other causes producing suppuration, such as foreign bodies, suppuration of the ethmoidal cells, etc., and the presence of pus usually fetid (often with a peculiar faint, sickly odour) in any portion of the nasal cavity or naso-pharynx, but by preference in the middle meatus. There is generally some swelling of the mucous membrane at the anterior extremity of the middle meatus, and mucous polypi may or may not be present. These, if present, should be removed before proceeding to the diagnosis of abscess of the antrum.

2. *Fränkel's Symptom*, that is, the flow of pus into the nasal cavity on hanging down the patient's head, at the same time turning it so that the suspected antrum is uppermost. The nasal cavity must have been previously very carefully cleaned with wool mops. The pus which runs out is generally seen at the front part of the middle meatus, but may appear at almost any point in the nasal cavity, for example, in the inferior meatus or between the middle turbinated body and the septum. It is to be noted, however, that pus from the frontal and ethmoidal sinuses may also find its way into the nose when the head is held in this position.

3. *Transillumination of the Superior Maxillary Bones by an Electric Lamp Placed in the Mouth.*—The part to the translucency of which especial attention should be directed is the outer half of the infraorbital region. When this region appears darker on one side than on the other it adds probability to the existence of an abscess on that side. Darkness is, however, often present without an abscess being there, and cases have been recorded in which transillumination showed no darkness, although there was an abscess in the antrum.

4. *Accessory Symptoms* are slight tenderness on firm pressure