

comes necessary for the cure of nervous complaints, and it is beneficial in all other asthenic conditions of the system.

It would require a treatise, instead of a paper suited to our social meetings, to set forth the benefits of change of air in nervous and other asthenic complaints. My object is to urge upon your attention the value of immediate change of air as the correct treatment for asthenic disease, instead of drug-medication. I advocate an interchange of patients amongst surgeons in different localities. There would be no loss in a pecuniary point of view, if the interchange were fairly carried out. It may become necessary to erect buildings, furnished simply, resembling caravansaries for eastern pilgrims, so as to accommodate poor strangers in search of health; but, in the meantime, the people must go to their friends, or to lodgings. My observations lead me to the conclusion that the poor are able to follow out the prescription of change of air in more instances than would readily be believed. The poor live one by the other, and assist one another to a much greater degree than do the middle classes. The poor have friends residing in neighbouring and even distant localities, and rarely refuse to receive their friends when sick.

Respecting choice of locality much might be said, more especially as respects geological formations and soil; but we are thankful to accept what we can get, and the poor are limited to the localities in which their friends reside. For my part, as my patients reside in a chalky district, I advise them to remove to Cox's Heath, where there is ragstone cropping out of the ground; also to Tunbridge Wells, where there is, in addition to wealden formation and iron-stone, a fine chalybeate spring. When it is impossible to obtain removal from one locality to another, I advise change from one house to another; and if this be impracticable, then change from one apartment to another.

Reviews and Notices.

THE SPAS OF EUROPE. By JULIUS ALTHAUS, M.D., Member of the Royal College of Physicians, London, etc. Pp. 494. London: 1862.

THIS is decidedly the most elaborate and complete book on mineral waters which has hitherto appeared in the English language. It contains six chapters.

In the first chapter, Dr. ALTHAUS discourses of the principal theories which have been held as to the origin of springs. He gives his full adhesion to the theory advanced by Mariotte and Halley—that the ultimate origin of springs is the atmospheric vapour, which is condensed into water—"meteoric water", as he calls it.

Springs produced directly by meteoric water are either descending or mountain springs, furnishing ordinary drinking water; or ascending springs, which contain many of the mineral waters. Ascending springs are produced when water courses along a penetrable layer enclosed by impenetrable strata. In these circumstances, the water is under considerable pressure; and, as soon as it encounters a rent, escapes to a height proportionate to the pressure. The place of escape may be very remote from the place of origin of the spring; it may be near the summit of a mountain, or on a plain, or even at the bottom of the sea. The ascending springs of direct meteoric origin are not subject to variations in quantity with the amount of atmospheric vapour precipitated; and this Dr. Althaus accounts for by sup-

posing the existence of subterranean caverns filled with water. Their saline constituents are derived from the rocks through which the waters are filtered.

Springs indirectly formed by meteoric water have their origin from sunken rivers, or those which pursue a subterranean course; from lakes on high elevations, which receive more meteoric water by precipitation than they give off by evaporation, and through the fissured bottom of which the water escapes; from the melting of the ice of glaciers, and the sinking of the water through permeable rocks; and a few springs are due to the condensation of steam arising from a volcanic soil.

The phenomenon of intermittence observed in some springs is then explained; and Dr. Althaus notices the Icelandic Geysers as displaying especially the phenomena of intermittence, of which he gives Professor Bunsen's explanation.

In the second chapter, Dr. Althaus discusses the Physical Properties of Mineral Waters; viz., their temperature, electrical properties, colour, and relation to the ray of light. The range of temperature of springs varies greatly. The Styx in Arcadia has a temperature barely above freezing-point—33° while the Urijino in Japan, and the Geysir and Strochr in Iceland, reach 212°.

The various causes which have been assigned to account for the temperature of the thermal springs are discussed by Dr. Althaus, who regards most of them as failing to give a satisfactory reason for the heat. He goes on then to observe that the first expression of a correct idea as to the cause of the high temperature of many springs was made by Patricius Bishop of Pertusa, in the third century; who

"When questioned by the Roman proconsul Julius to the origin of the heat of the springs of Carthage ('quo auctore fervens hæc aqua tantum ebulliat') answered that it was the same heat which caused the eruption of Vesuvius and Etna, and which imparted warmth to the springs in proportion to the depth of their origin."

In ascribing the merit of this idea to Bishop Patricius, however, Dr. Althaus seems to have overlooked the fact that, as he has himself mentioned at a previous page, the theory of a subterranean fire was laid down by Empedocles; and that Vitruvius had attempted to explain *how* it was kept burning—viz., by alumina, bitumen, and sulphur.

The theory that the warmth of the water of springs is dependent on the depth from which it has come—i. e., on subterranean heat—is shewn by Dr. Althaus to be explanatory of certain otherwise anomalous phenomena, such as the rising of hot springs in close proximity to others which are cold.

The temperature of springs is also influenced more or less by that of the meteoric water at the time of its precipitation; by the elevation of the source of the springs; by the quantity of water discharged, by volcanic action, by earthquakes, etc. The operation of these agencies is discussed by Dr. Althaus, who also devotes several pages to a refutation of the improbable theory held by some, that the heat of thermal waters is of a different nature from ordinary heat.

The third chapter is on the Chemical Composition of Mineral Waters. Dr. Althaus explains whence the mineral ingredients are derived, viz., as was supposed by Aristotle and Pliny, and proved by Berze-

lius, Struve, and Bischof, from the soil through which the waters flow; explains how far the quantity of salines is influenced by temperature, hydrostatic pressure, and the presence of carbonic acid in the water; notices the variations sometimes observed in the composition of mineral waters; and traces the effects of the waters in producing deposits at their point of emergence, and in breaking up and decomposing rocks in the interior of the earth by removing from them their more soluble constituents.

For the qualitative analysis of mineral waters, Dr. Althaus speaks of the spectral method of Bunsen and Kirchhoff (which he describes) as admirably adapted.

The gaseous and solid ingredients of mineral waters are considered in detail under the heads of carbonic acid; sulphuretted hydrogen, sulphurous acid, sulphuric acid, and sulphurets; oxygen; nitrogen; steam; carburetted and subcarburetted hydrogen; carbonates and bicarbonates; chlorides; iodides; bromides; sulphates; silicates; phosphates; boracic acid; fluorides; nitric acid; arsenic, antimony, and other metals; petroleum and naphtha; organic acids; baregine; and plants and infusoria. For an account of the springs in which the several substances are found, and how they happen to be there (when this can be explained), we must refer our readers to the book itself.

The name *baregine* has been given to gelatinous deposits often met with in the neighbourhood of thermal springs; they were first discovered in large quantities at Barèges.

"They are mostly amorphous, uncoloured, and transparent; but sometimes they appear yellow, green, brown, or even black, and contain cells and tubes. The most remarkable deposits of this kind are found in Ischia, where thermal waters containing nitrogenous substances run down steep rocks, and organic membranes are formed which have a thickness of several inches." (P. 125.)

Science has not yet decided what is the real nature of this substance. At present, the matter stands thus:—

"M. Fontan discovered a delicate conferva in the deposits of sulphurous springs, which he called *sulphuraire*; and Alibert believed baregine to be due to a decomposition of this plant. M. Lambron declared for Alibert's view, and stated that in the process of decomposition two different substances were formed; the coat of the *sulphuraire* was changed into a sort of mucus, and its internal substance into a heavy soapy mass, which assumed different colours according to the nature of the substances with which it came in contact. M. Boujeau, who has more recently investigated the subject, distinguishes two substances, which he calls glairine and glairidine. Glairine is, according to him, deposited wherever sulphurous thermal waters come in contact with the atmosphere; it contains little nitrogen and no iodine, is scarcely soluble in water and insoluble in ether; after having been exposed to the atmosphere for some time it turns grey, and when dried looks like horn. Glairidine, on the other hand, is deposited when rain-water mixes with sulphurous springs; it is dark grey, and turns green on the addition of alkalis; it contains traces of iodine; and is quite insoluble in water and ether." (Pp. 125-6).

Dr. Althaus, at the end of the chapter, gives a classification of mineral waters according to their chemical composition; premising, however, that, like all other classifications of the kind, "it must be con-

sidered as devoid of philosophical exactness, and as a mere matter of convenience and aid to the memory." We give the classification in a tabular form:—

Class.	Division.	Chief contents.	Example.
1. ALKALINE.	a. Alkaline acidulous.	Carbonic acid and bicarbonate of soda.	Vichy.
	b. Alkaline muriated acidulous.	Carbonic acid, chloride of sodium, and bicarbonate of soda.	Ems.
	c. Alkaline saline.	Bicarbonate and sulphate of soda.	Carlsbad.
2. BITTER.	Sulphates of soda and magnesia.	Friedrichshall.
3. MURIATED WATERS.	a. Simple muriated.	Moderate amt. of chloride of sodium.	Wiesbaden.
	b. Muriated lithia.	Chlorides of sodium and lithium.	Baden-Baden (Murquelle).
	c. Drines.	Large amount of chloride of sodium.	Rehme.
	d. Isolated muriated.	Iodide of sodium.	Castrocarro.
	e. Bromated muriated.	Bromide of magnesium.	Kreuznach (Oranienquelle).
4. EARTHY SPRINGS.	Carbonate and sulphate of lime.	Leuk.
5. INDIFFERENT THERMAL SPRINGS.	A very small amount of salines.	Gastein.
6. CHALYBEATES.	a. Acidulous chalybeates.	Carbonic acid and bicarbonate of protoxide of iron.	Schwalbach.
	b. Saline acidulous chalybeates.	Sulphate of soda, and bicarbonate of protoxide of iron.	Franzenbad.
7. SULPHUROUS SPRINGS.	a. Springs containing sulphuretted hydrogen.		Eilsen.
	b. Springs containing sulphurets of metals.		Bagnères de Luchon.

The fourth chapter is on the Geographical Distribution of Mineral Waters. It is so exhaustive of the subject, and so concise at the same time, that an analysis of it is impossible.

The fifth and sixth chapters are devoted respectively to descriptions of the Physiological Action of Mineral Waters and of their Therapeutical Action. For the reason assigned in reference to the fourth chapter, and because we have already occupied so much space, we cannot give them the notice which their value, and the learning displayed in them, deserve. In the chapter on Physiological Action, Dr. Althaus takes up the whole subject of the action of water, ordinary as well as mineral, on the human body; and gives an epitome of all that is known and of all the researches that have been made on the subject. In the chapter on the Therapeutical Use of Mineral Waters, he first gives a very interesting notice of their employment in antiquity, and traces the history of the investigations which have been made regarding their composition and therapeutic action down to the present time. He then gives general rules as to the use of mineral waters, noticing in his way the "grape-cure" and "pine-leaf-cure"; and concludes his chapter by pointing out the composition of one or more mineral springs of each of the classes referred to in the preceding table, and the constitutional states in which the use of each is indicated.