

of the latter than of the former." The cases that most frequently fall into the hands of bone-setters, and are cured, to the joy of the patient, but to the discredit and loss of reputation of the regular practitioner, are those of slight fibrous ankylosis, of a degree sufficient to limit motion and impair the functional utility of the limb, yet not such as apparently to demand forcible rupture, an operation so unreasonably dreaded by many surgeons. In such a case, perhaps, some feeble attempts at passive motion are made. The joint is flexed cautiously and slowly, until the patient complains bitterly of pain; then the operator desists, orders the limb to be kept at rest, and bathed with lotions to subdue the inflammation excited by the strain put upon the adventitious bands. A few days later, when the heat and swelling have disappeared, the same manipulations are repeated, and followed again by inflammation and its treatment. After a number of repetitions of this sort the patient sees that he is no better than before, and refuses to submit his joint to any further manipulations. Then he becomes discouraged, limps around with the aid of a cane or crutches, and tries to bear philosophically the thought that he is a cripple for life. But at last some friend tells him of a wonderful cure performed by a bone-setter in a case apparently similar to his own, and in desperation he sends for the quack. The latter assures him that the bone is out and only needs to be replaced. He orders the joint to be enveloped for a time in flaxseed poultices, probably a procedure that contributes in no way to the success of the operation, and then on the appointed day meets his patient, seizes the limb, and with a quick motion flexes and extends the joint to its full extent, breaking up all the adhesions, and the patient finds that he is cured. The pain of the operation is but little greater than that inflicted by the regular practitioner in his feeble and ineffectual attempts to restore motility, and the resulting inflammation is usually slight or nil. The quack says that the bone is restored to its place, pockets his fee, and retires with glory.

This is no exaggerated picture, but is a true tale of what actually occurs in not a few instances, as many practitioners will sorrowfully admit. The good that bone-setters do is in these cases of partial ankylosis, and it is because they are unable to discriminate between the different conditions in which joint motion is impeded that they so often inflict irreparable injury. No surgeon would attempt forcibly to move an articulation which is the seat of strumous or tuberculous inflammation, yet this is what the bone-setter does with dire result. In most of the joints which can be benefited by forcible movements there is a tender spot, usually about the inner side, for which the bone-setter always feels, and the discovery of which is to him a sign of ultimate success. The motion of the joint is not absolutely abolished, but is limited in certain directions, and any attempt to pass this limit causes pain. The skin over the articulation is not hot, and all the other signs of inflammation, except perhaps a slight serous effusion, are absent. The following is an enumeration of the location of these painful spots, together with Mr. Fox's explanations of their occurrence, as given by Mr. Edward Cotterell in a very practical little work treating of the minor injuries of the limbs.² 1. "Over the head of the femur, in the centre of the groin, corresponding to the ilio-femoral band of the capsular ligament (which is most severely stretched when the thigh is over-extended, as when the trunk is flung violently backward, the commonest cause of a sprained hip). 2. For the knee joint, at the back of the lower edge of the internal condyle; in other words, at the posterior border of the internal lateral ligament, where it blends with Winslow's ligament, and where the semi-membranous tendon is in intimate relation with it. These parts suffer most because, as Mr. Morris says, 'during extension they resist rotation outward of the tibia upon a vertical axis, and a sprained knee is almost always caused by a twist outward of the foot.' 3. For the ankle, on the front of the external malleolus, the apex of the plantar arch, and the tip of the fifth metatarsal bone. 4.

For the shoulder, at the point corresponding to the bicipital groove, because in nine cases out of ten a man sprains his shoulder to prevent himself from falling; his hand grasps the nearest support, the body is violently abducted from the arm, the long head of the biceps is called upon to exert its utmost restraining power, the bicipital fascia is overstretched, and the tendon very often misplaced. 5. For the elbow, in front of the tip of the internal condyle; the fan-shaped internal ligament has its apex at that point, and it is most stretched in over-supination with extreme extension of the forearm. 6. For the wrist, the styloid process of the ulna, and the annular ligament in front of the wrist."

The injuries or diseases most likely to give rise to the slight degree of ankylosis which is amenable to the bone-setter's manipulations are rheumatism and gout, displaced tendons or cartilages, sprains, prolonged immobilization during the treatment of fractures, neuromimetic joint affections treated improperly by rest and mechanical support, and ganglions.

The bone-setter's manipulations consist in first locating the painful point, upon which the thumb is firmly pressed during the remainder of the operation; and then, while the operator steadies the proximal segment of the limb, the distal segment is grasped and rotated as much as possible on its axis in order to overcome, as far as may be, muscular resistance, this being accomplished, the joint is sharply flexed or extended in the direction of greatest resistance, and then the reverse movement is made until all the adventitious bands are broken, or until the "bone is put back," in the bone-setter's own phraseology. The rupture of these bands of adhesion is often accompanied by a loud report. For a description of the special manipulations required for each joint, the reader may consult the work of Wharton Hood, above referred to.

It should not be forgotten that most of these stiff joints may be prevented by a proper attention to the treatment of minor injuries of the articulations, and this is one of the principal lessons which we may learn from the bone-setters. If surgeons would never dismiss a case of fracture or sprain until joint motion were perfectly restored, the occupation of the bone-setter would be less lucrative than it now is.

¹ On Bone-Setting (So-Called), and Its Relation to the Treatment of Joints Crippled by Injury, Rheumatism, Inflammation, etc. By Wharton P. Hood, M.D., M.R.C.S., London and New York, 1871.

² On Some Common Injuries to Limbs: Their Treatment and After-Treatment, Including Bone-Setting (So-Called). By Edward Cotterell, M.R.C.S., Eng., L.R.C.P., Lond., London, 1885.

BONES, TEETH, AND CARTILAGE, CHEMISTRY OF.—The bones of vertebrates consist essentially of an organic basis of ossein and the so-called bone earths made up of inorganic salts. Elastin, fat, proteids, and nuclein are also present. Ossein is identical with or very similar to the collagen of connective tissue. In the bone earths calcium predominates in the bases, but small quantities of magnesium are also present and, according to some authors, traces of potassium and sodium. These bases are for the most part in combination with phosphoric acid, but some carbonic acid is found, and traces of chlorine and fluorine. The sulphuric acid mentioned by some writers is probably derived from some of the organic constituents and does not properly belong to the bone earths. There is some difference of opinion as to how the bases and acids are combined, but according to Gabriel the simplest expression for the composition of the ash is $[Ca_2(PO_4)_2 + Ca_2HP_2O_7 + Aq]$ in which two to three per cent. of the lime is replaced by magnesia potash and soda and four to six per cent. of the phosphoric acid by carbon dioxide, chlorine, and fluorine. As age advances the bones become richer in ash and poorer in water. Hoppe-Seyler gives the following composition for undried bone without separation of marrow or blood: Water, 50 per cent.; fat, 15.75 per cent.; ossein, 12.40 per cent.; bone earths, 21.85 per cent. The composition of the bone earths is given as follows by Zalesky in parts per thousand:

	Man.	Ox.
Calcium phosphate, $Ca_3P_2O_8$	838.9	860.9
Magnesium phosphate, $Mg_2P_2O_7$	10.4	10.2
Calcium combined with CO_2 , F , and Cl	76.5	73.6
CO_2	57.3	62.0
Chlorine.....	1.8	2.0
Fluorine.....	2.3	3.0

Bone marrow is composed chiefly of fat (96 per cent.), containing the fatty acids of ordinary adipose tissue in the proportion of palmitic acid 22, stearic acid 10, and oleic acid 63 per cent. of the total fatty acids. Proteid is present in small quantities, especially in the red marrow of the spongy bones. It is principally in the form of globulin and nucleo-albumin, with traces of albumin. Among the extractives of marrow are lactic acid, hypoxanthin, and cholesterolin.

The teeth consist of crista petrosa, dentine, and enamel. The crista petrosa is a true bony structure and resembles ordinary bone in composition. Dentine is very similar in composition, but contains less water. Enamel is an epithelial structure containing scarcely any water but rich in lime salts. Its organic constituents differ from the ossein of bone and dentine in not yielding any gelatin on boiling. The following composition is given for the teeth by Hoppe-Seyler from analyses by Aeby:

Constituents.	Dentine.	Enamel.
$Ca_{10}CO_2(PO_4)_4$	72.06	96.00
$MgHPO_4$.....	.75	1.05
Organic substances.....	27.70	3.60

Cartilage.—The organic basis of cartilage was formerly known as chondrigen and the gelatin-like substance obtained from it on boiling was known as chondrin; but it is now recognized that the so-called chondrigen is a mixture, containing the following as its chief constituents.

1. Collagen, resembling closely that of connective tissue.
 2. An albuminoid substance, resembling elastin but richer in sulphur.
 3. A mucin-like substance, known as chondro-mucoid and capable of decomposition into a proteid and chondroitin acid.
 4. Chondroitin acid or chondroitin-sulphuric acid, present in combination in chondro-mucoid and also uncombined. Schmieberg ascribes to chondroitin acid the formula $C_{12}H_{17}NSO_{17}$.
- The inorganic constituents of cartilage are characterized by the abundance of sodium which in adult mammals is principally combined with sulphuric acid. In mammalian embryos and in lower vertebrates the sulphuric acid is largely replaced by chlorine. The composition of cartilage is summarized by Hoppe-Seyler as follows:

In 1,000 parts.	Costal Cartilage.	Articular Cartilage.
Water.....	676.6	735.9
Solids.....	323.3	264.1
Organic.....	301.3	248.7
Inorganic.....	22.0	15.4

Salts in one hundred parts of ash:

Potassium sulphate.....	26.66
Sodium sulphate.....	44.81
Sodium chloride.....	6.11
Sodium phosphate.....	8.42
Calcium phosphate.....	7.88
Magnesium phosphate.....	4.55

Wesley Mills,
William S. Morrow.

BORAGE.—The leaves and flowering tops of *Borago officinalis* L. (fam. *Boraginaceae*). A European or Oriental plant, occasionally cultivated in flower gardens in the

United States. It has a succulent, branched, hairy stem, half a metre or so high (twenty inches), with rough, coarse-looking, entire leaves, and terminal one-sided cymes of pretty blue flowers. Borage has been a domestic medicine in Europe for years. Its odor is slight, at least when dry; taste, bland and mucilaginous. It contains no more active principles than mucilage and nitrate of potassium, and its medical qualities are only those of a mild demulcent. W. P. Bolles.

BORDIGHERA.—A marine health resort on the Mediterranean coast of France, 10 miles east of Mentone and 3 miles west of the Italian boundary.

Bordighera is a conspicuous object nearly all along the western Riviera, as it is seen glittering in the sunshine, its houses clustered together on a promontory that projects far out into the sea. It is the only health resort on this coast that occupies a position on a promontory; all the others being built round bays or depressions in the coast. It is naturally, therefore, much exposed to winds, that is to say, to all those winds that can reach it in blowing across the sea; the east, the southeast, the southwest, and the west winds can all blow freely upon this promontory. But it is well protected by mountains to the north, northeast, and northwest, whence the coldest winds come. Moreover, it must be remembered that all the winds that reach it must, on account of its position, come to it from the sea, and impregnated with saline emanations. And this is the sole distinguishing characteristic of the climate of Bordighera as compared with that of neighboring stations; the predominating influence of sea air rendering it essentially bracing and tonic" (Burney Yeo).

Bordighera is a small town of 2,500 inhabitants, and the portion devoted to invalids is called the "new town," or English quarter, and is on level ground to the west of the promontory. The hotels and villas are surrounded by groves of olive, lemon, and palm trees. The latter grow to a great height and are said to be more plentiful than in any other part of the Italian Riviera. "It is said that there are more palms in the neighborhood of Bordighera than in the whole of Palestine" (Dean Alford). The natives have a monopoly of supplying the Vatican with palm leaves for Palm Sunday. Dense olive groves also cover the plain upon which the new town is situated. The drainage of the town is primitive, but the place is said to be healthy, and the hygienic conditions are considered good. The water supply is obtained from wells, and from a spring in the flank of Monte Nero (Goodchild). During a residence of fifteen years Dr. Goodchild has seen no case of typhoid fever or diphtheria among the members of the English colony.

The average monthly temperature for the months from October to May inclusive is as follows:

MEAN TEMPERATURES, 1876-79.

October.....	63.5° F.	February.....	49.1° F.
November.....	55.0° F.	March.....	50.5° F.
December.....	49.0° F.	April.....	53.1° F.
January.....	49.6° F.	May.....	61.0° F.

The temperature averages about three degrees lower than that of Mentone, according to Dr. Goodchild, and the range is smaller. The relative humidity approximates to that at San Remo, which has a yearly average of 66.7 per cent. The rainfall also is about the same as at San Remo, at which place the number of days on which rain falls during the season is thirty. "At Bordighera the mistral is the west wind, being turned completely in that direction by the mass of mountains behind Monaco, and from being forced to blow over the sea it loses somewhat of its dry and cold character" (Burney Yeo). "The soil upon the hillsides is limestone and conglomerate, but upon the flat it is composed of old sandy sea beaches, in which the water rapidly finds the sea level. About a couple of acres near the English church possesses a soil, however, in which there is a small admixture of clay and which is somewhat damp in consequence" (J. A. Goodchild, M.D.).

The climatic characteristics of Bordighera can be summarized as those of a Mediterranean health resort, affording pure sea air, a mild equable winter temperature, a comparatively low relative humidity, and, in common with the other resorts of the Riviera, a large amount of sunshine. Thus, an outdoor life in a mild bracing sea air is afforded. The variety of level shady walks among the palms and olive trees, and the attractive excursions in the neighborhood add a charm and interest to the invalid's life there.

The class of diseases which are likely to be benefited by this climate are those requiring a warm, moderately moist sea climate. As has been said before (*vide* note upon *Algiers*), a climate of this character is not an especially curative one for phthisis, and all that can generally be expected of it in this disease is to ameliorate symptoms and prolong life. Strumous cases, especially in children; patients with anæmia, diabetes, or albuminuria; convalescents from acute diseases; the weak and debilitated; sufferers from chronic bronchial catarrh, from catarrh of the stomach and intestines, and from various other conditions of constitutional feebleness, find here a suitable climate—"cheering to the mind and invigorating to the body."

Bordighera is not suitable for the febrile and for those who are very nervous and sensitive. The accommodations are said to be very comfortable, although somewhat limited. "English tastes are consulted, as nearly all the visitors are English or Americans" (Ball).

Bordighera may be reached via Marseilles, or by way of Turin and Savona. By the former route it is thirty-three and a quarter hours distant from London.

Edward O. Otis.

BORIC ACID.—Boric acid (H_2BO_3), often called by the older but less correct name of *boracic acid*, is official in the United States Pharmacopœia under the title *Acidum Boricum*, Boric Acid. It is described as "transparent, colorless scales, of a somewhat pearly lustre, or, when in perfect crystals, six-sided, triclinic plates, slightly unctuous to the touch, odorless, having a faintly bitter taste, and permanent in the air. Soluble, at 15° C. (59° F.), in 25.6 parts of water, and in 15 parts of alcohol; also soluble in 10 parts of glycerin. Addition of hydrochloric acid increases its solubility in water. An aqueous solution (1 in 50) of boric acid colors blue litmus paper red" (U. S. P.).

Boric acid is a very feeble acid chemically, and physiologically lacks the ordinary acid qualities of sour taste and tendency to irritate. Even a saturated aqueous solution is tasteless, and without irritant action on even so sensitive a part as the conjunctiva. Constitutionally, also, in all ordinary applications, the drug is harmless; but yet poisoning and even death have followed, in a few cases, a very extensive use of the acid. The essential symptoms in such cases were nausea, vomiting, hicough, feeble heart action, and fall of temperature, with the development of an exanthematous rash, affecting particularly the legs.

Boric acid is useful in medicine by reason of its power to arrest the multiplication of microbes. But yet this same power has been overrated. The experiments of Sternberg,* the most precise with which the writer is acquainted, assign to the acid the power of preventing the development of the micrococcus of pus in a one-half per cent. solution; but in the matter of *permanently sterilizing* such organisms—quite another story—the experiments record complete and repeated failure even in saturated (four-per-cent.) aqueous solution, and this not only in the cases of the micrococcus of pus and that of septicæmia, but also in the case of the common *bacterium termo*.

Boric acid, therefore, must be regarded, in the present state of knowledge, as a fairly efficient antiseptic—convenient withal, because odorless, tasteless, unirritating, and non-poisonous in ordinary application—but must not

* American Journal of the Medical Sciences, April, 1883.

be relied upon as a germicide in the proper understanding of the term. Probably because of its antiseptic action, boric acid, locally applied, tends to abate the catarrhal process, and is, for such application, peculiarly agreeable because non-irritating. As a collyrium in conjunctivitis, a gargle in pharyngitis, or an injection in cystitis, solutions of boric acid are, therefore, often efficacious, and at least innocent of harm. For an application to catarrhal surfaces, or for antiseptic purposes to wound surfaces, boric acid may be used in aqueous solution ranging from one to four per cent. in strength—the latter being, indeed, at ordinary temperatures, a saturated solution.

A stronger solution, if wanted, is obtainable by using a mixture of equal parts of boric acid and borax, which dissolves to the extent of sixteen per cent. of water at ordinary temperatures. A convenient and efficient wound dressing may be made by soaking lint in a hot saturated aqueous solution of boric acid, and then allowing it to dry. A boric-acid ointment also has been recommended, where, to a melted mixture of one part each of white wax and spermaceti and six parts of vaseline, is added a proportion of from two to four parts of a saturated solution of boric acid in glycerin. Also the substance *boroglyceride* (see *Boroglyceride*) affords a means of applying boric acid in strong solution. Boric acid has also been given internally in doses of 2 gm. (gr. xxx.) frequently repeated, with no poisonous effect, and with asserted benefit in dyspepsia with fermentation of the ingesta, in chronic cystitis, in diphtheria, and in other diseases probably determined by the multiplication, within the system, of microzymes. Edward Curtis.

BORLAND MINERAL WELL.—Pleasants County, West Virginia. The well from which the Borland Mineral water flows is situated on the bank of Blue Creek, 6 miles from Salama, on the Ohio River Railroad, and 30 miles northeast of Parkersburg. At present there is no hotel in the vicinity, but nearby farmhouses accommodate a limited number of guests who wish to use the water from the well. The surrounding hills and valleys present some very pleasing landscapes. The water rises from a flowing well, being forced upward by the natural-gas pressure from a depth of three hundred feet. An analysis by Prof. T. G. Wormley, of Philadelphia, showed the following mineral ingredients:

ONE UNITED STATES GALLON CONTAINS:	
Solids.	Grains.
Sodium chloride	240.07
Sodium bicarbonate	112.16
Sodium sulphate	37.84
Magnesium bromide	.28
Potassium sulphate	22.62
Magnesium iodide	.02
Magnesium chloride	2.13
Calcium bicarbonate	3.12
Magnesium phosphate	.23
Aluminum and iron carbonate	.64
Manganese	Trace.
Silica	.58
Organic matter	Trace.
Total	432.28
Sulphureted hydrogen	.....A perceptible quantity.

This water is quite a strong muriated, alkaline saline. It is a very efficient antacid laxative, with diuretic and diaphoretic properties. It also derives a certain tonic and restorative influence from the presence of iron, phosphorus, and manganese. In addition to its table value it has been found to possess excellent therapeutic properties in chronic affections of the stomach, bowels, liver, and kidneys. It acts with great efficacy in renal dropsy. James K. Crook.

BOROLYCEIDE.—Under this title there has been introduced into medicine a compound formed by direct reaction of boric acid upon hot glycerin. In this reaction tribasic boric acid replaces the three hydroxyl equivalents of the molecule of glycerin, forming *glyceryl borate*,

$C_3H_5BO_3$, with evolution of water, as per the following equation: $C_3H_5(OH)_3 + H_2BO_3 = C_3H_5BO_3 + 3H_2O$. Boroglyceride is a solid, vitreous body, transparent, and of a light amber color. It has little odor, and a slightly sweetish taste, with a faint astringent twang. It is hygroscopic, rapidly becoming sticky on exposure to the atmosphere. It dissolves freely in glycerin, and melted into an equal weight of that fluid, forms a permanent, viscid, clear solution. The solubilities in water and alcohol have been stated very variously. A sample tested by the writer broke up into opaque, granular flakes by treatment with cold water, but finally dissolved in ten times its weight of that fluid; and in cold absolute alcohol it dissolved slowly but completely, in even less than its own weight, forming a clear, syrupy solution.

Boroglyceride is reported to be strongly antiseptic, and was originally proposed by Barff, before the Society of Arts of London, as an agent for the preservation of food-stuffs. Taken internally it has seemed to be as innocent as the two substances of which it is compounded. It has so far been used in medicine locally only, being applied—generally in glycerin solution—as a dressing to wounds, ulcers, catarrhal mucous membranes, etc. It is claimed to be at once antiseptic, astringent, and healing, while inodorous and practically unirritating. It is most commonly employed in fifty per cent. glycerin solution, or in ointment made by mixing one part of such glycerin solution, while hot, with three parts of vaselin. What amounts to a fifty-per-cent. glycerin solution of boroglyceride is official in the United States Pharmacopœia, under the title *Glyceritum Boroglycerini*, Glycerite of Boroglycerin. In this case the solution is made directly by treating boric acid with hot glycerin in proper proportion. The preparation is a colorless, glycerin-like fluid.

As a preservative, boroglyceride has been recommended in solutions ranging from two per cent. to five per cent. in strength. Edward Curtis.

BORNEOL.—*Borneo Camphor*; *Dryobalanops Camphor*. ($C_{15}H_{11}-OH$). A camphor-like body occurring in the wood, and in lumps in the cavities thereof, of *Dryobalanops aromatica* Gaertn. (fam. *Dipterocarpaceæ*), in a number of *Conifera*, in valerian, rosemary, and several other aromatic plants. The article is not exactly the same, differing especially in its optical properties, from these different sources. That commonly sold is artificially made from ordinary camphor by the action of sodium. This differs from ordinary camphor in its much higher melting and boiling points, and in not crystallizing upon the sides of the glass containers. It is crystalline and soluble in alcohol. It is used externally as a disinfectant to sores. H. H. Rusby.

BORRAGINACEÆ.—A family of some eighty-five genera and nearly fifteen hundred species, most widely dispersed, but mostly in warm temperate climes. Except for ornamental purposes, especially the heliotropes and forget-me-nots, the family is but little utilized. Its chief use at present is to yield the coloring matter alkanna red. Historically, it is of considerable interest in medicine, the borage, comfrey, lungwort, eritrichium, vipers bugloss, and other drugs having formerly enjoyed a high, though ignorant repute. Although some of their alkaloids are quite active, they occur in inconsiderable proportions. H. H. Rusby.

BORTHWICK MINERAL SPRINGS.—Also known as the Ottawa Mineral Springs. POST-OFFICE.—Ottawa, Canada. ACCESS.—By carriage drive from Ottawa. ANALYSIS.—By I. Baker Edwards.

ONE PINT CONTAINS:	
Solids.	Grains.
Chloride of sodium	98.081
Chloride of potassium	1.310
Chloride of calcium	1.832

Solids.	Grains.
Chloride of magnesium	2.713
Bromide and iodide of magnesium	.351
Sulphate of calcium	2.019
Sulphate of magnesium	2.450
Iron, strontium	Traces.
Total	108.756

This is an unusually pure saline water, containing a large percentage of iodine and bromine. A small amount of purgative salts is also present, forming an excellent combination. There is no aëration with carbonic acid. These waters are extensively used by the residents of Ottawa and vicinity. Their reputation is steadily increasing and their sale has assumed enormous proportions. Beaumont Small.

BOSTON.—Massachusetts. Although this and various other cities which will be mentioned in the HANDBOOK are not health resorts, yet it frequently happens that an invalid is obliged, from reasons of necessity, to spend more or less time in them, and it is a satisfaction to know something of the climate and weather which may be expected. Further, as Dr. Huntington Richards, the previous editor of this department, says: "One can better form an opinion of the climate of any health resort he may have under consideration, if he compares it with that of the place in which he resides or with that of some place with which he is familiar." For these reasons, then, the climatic tables and general weather conditions of the principal cities of the United States will be given.

The climate of Boston is characterized by great variability and range, from a possible maximum of 101° F. in July to -13° F. in January. The east winds, although not the prevailing ones, as the climatic table indicates, are still frequent enough to form one of the peculiar characteristics of this climate. They are damp and chilly in winter and early spring, and render outdoor existence exceedingly uncomfortable.

"A chill no coat, however stout,
Of homespun stuff can quite shut out—
A hard, dull bitterness of cold."

In the summer, on the contrary, they modify the heat and are very refreshing. Ask any inhabitant what is the one striking climatic peculiarity of Boston, and he will immediately reply, "The east wind."

CLIMATE OF BOSTON, MASS. LATITUDE, 42° 21'; LONGITUDE, 71° 4'. PERIOD OF OBSERVATION, FROM 13 TO 25 YEARS. ELEVATION OF PLACE OF OBSERVATION ABOVE SEA LEVEL, EIGHTEEN FEET.

Data.	Jan.	Mar.	July.	Year.
<i>Temperature</i> (Fahrenheit Scale).				
Average or normal	27.0°	34.2°	71.3°	48.2°
Average daily range	17.2	16.5	17.9	
Mean of warmest (average maximum)	35.3	42.2	80.8	
Mean of coldest (average minimum)	18.1	26.7	62.9	
Highest or maximum	70.0	72.0	101.0	
Lowest or minimum	-13.0	-7.5	46.0	
<i>Humidity.</i>				
Mean relative (average)	71.8%	69.4%	70.8%	69.6%
<i>Wind.</i>				
Prevailing direction	N.W.	N.W.	W.	W.
Average hourly velocity in miles	12.2	11.3	8.5	
<i>Weather.</i>				
Average number of clear days	8	8.7	8	103
Largest " " "	13	15	15	
Smallest " " "	4	3	3	
Average " " " " fair " "	10.6	9.5	13.7	134.6
Largest " " " "	15	20	20	
Smallest " " " "	7	3	3	
Average " " " " cloudy " "	12.4	12.5	9.4	135
Largest " " " "	19	23	23	
Smallest " " " "	7	3	3	
Average number of rainy days, .01" inch and over	12.2	13.7	11	130
Largest " " " "	18	17	16	
Smallest " " " "	4	6	6	

The cold season begins in November, although it is occasionally mild even to Christmas, and continues until April; snow is for a great part of this time upon the ground, although not always continuously. March, on account of the high cold winds, is one of the most disagreeable months of the year, and June one of the most delightful, although the latter part of the month may be uncomfortably hot. In the summer, the heat, oppressive at times on account of the dampness, is not continuous, and in the writer's experience, from a climatic point of view, the spring and summer are the best seasons to spend in the city, and January, February and March, the months to be avoided by a change to a milder climate. Fashion, however, has it otherwise. The writer recalls the case of a family whose members had come on from St. Louis, in search of an Eastern seaside resort, but who, on arriving in Boston, had found the place so comfortable that they decided to remain there the whole summer.

The excursions by water are numerous and very delightful, and the country around is easily accessible and attractive. Boston is noted for its beautiful suburbs.

Edward O. Otis.

BOSWELL SPRINGS.—Douglas County, Oregon.

POST-OFFICE.—Boswell. Hotel.

ACCESS.—Boswell is a flag station on the Southern Pacific Railroad (Shasta Route), 163 miles south of Portland. The location of the hotel is one hundred feet from the railroad.

The situation is on Elk Creek, about 45 miles from the coast and 350 feet above tide water. The surrounding country is made up of hills and valleys. There are two springs at the resort.

A partial analysis of the stronger spring, made at the University of California, showed the presence of two thousand grains of solid matter to the United States gallon, made up chiefly of the following ingredients: Iron, bromine, potassium, calcium, magnesium, sodium.

The weaker spring was analyzed by Philip Harvey, of Portland, Ore., who gave its contents as follows:

ONE UNITED STATES GALLON CONTAINS:	
Solids.	Grains.
Sodium chloride.....	173.00
Magnesium chloride.....	145.00
Calcium chloride.....	115.00
Iron carbonate.....	Small quantities.
Calcium.....	Small quantities.
Total.....	433.00

Both springs are heavily charged with carbonic acid and sulphureted hydrogen gas. The waters are evidently of the muriated-saline-chalybeate variety. They have been found useful in constipation, chronic malarial infection, dyspepsia, functional liver complaints, and other disorders.

J. K. Crook.

BOTHRIOCEPHALUS LATUS. See *Cestoda*.

BOULDER.—Colorado. A town of 4,000 inhabitants, situated at an elevation of 5,300 feet above sea level, in the heart of the Rocky Mountains, 30 miles northwest from Denver. "The town is situated close to the foothills near the entrance to the Boulder Cañon" (Solly). The soil is dry and porous, except in areas of clayey soil. The water supply comes from a reservoir on Boulder Creek, five miles above the town, and also from wells, springs, and the creek itself. The hotels are said to be fair (Solly).

Although the meteorological data for Boulder itself are very incomplete, so far as the writer has been able to learn, they cannot be very different from those at Denver, thirty miles away (see article on *Denver*). Solly gives the mean monthly temperature for Boulder, from observations extending over a period of one year and a half, as follows: Winter, 30° F.; spring, 49° F.; summer, 65° F.; autumn is not obtainable. The average number of cloudy days during the winter is 13.

Boulder is one of the many representative places in the great high-altitude, health-resort belt of the Rocky Mountains, extending from Wyoming south along the eastern base of the Rocky Mountains, through Colorado into New Mexico, and then turning southwest into Arizona. "In this belt no particular spot is materially better than another, so far as climatic conditions are concerned" (Report of the Committee on Health Resorts. Transactions of the American Climatological Association, 1895).

Boulder, like many other localities in this belt, would seem to offer an almost ideal climate for the high-altitude treatment of phthisis: almost constant sunshine—but thirteen cloudy days on an average during the winter, clear bracing air, low relative humidity, nights that give invigorating sleep and rest, and grand mountain scenery. But it is well to repeat what has been before said, that climate is but one factor, although an exceedingly important one, in the treatment of phthisis, and in order to obtain the greatest advantage from any climate, however ideal, there must be at hand proper hygienic conditions and wise medical supervision. Phthisical patients in health resorts require, as a rule, constant guidance and restraint; they must know when to practise the *rest cure*, and when it is safe to take exercise and how much.

Edward O. Otis.

BOULDER HOT SPRINGS.—Jefferson County, Montana.

POST-OFFICE.—Boulder. Hotel and cottages.

These springs are located within two miles of the town of Boulder, about midway between Butte and Helena. They are reached by both the Northern Pacific and the Great Northern Railroad. The springs are numerous, and some of them have a large outflow of water. The surrounding country is of a rugged, mountainous character, the location of the springs being 4,904 feet above the sea level. The following analysis, supplied by Mr. George B. Beckwith, manager of the springs, was made at the Columbia School of Mines, New York City:

ONE UNITED STATES GALLON CONTAINS:

Solids.	Grains.
Sodium chloride.....	4.70
Sodium sulphate.....	4.30
Sodium carbonate.....	2.60
Calcium carbonate.....	1.30
Magnesium carbonate.....	3.60
Sulphur.....	4.80
Iron.....	2.90
Total.....	24.20

The temperature of the springs ranges from 125° to 187° F. The water is said to be very palatable as a beverage. The hotel is heated by the water of the springs, and bathing facilities are abundant. The diseases especially benefited here are rheumatism, indigestion, chronic constipation, renal, cutaneous, and hepatic diseases, and metallic poisoning.

J. K. Crook.

BOURNEMOUTH, England, is a city of 17,000 or more inhabitants, and is situated on the south coast of England, in Hampshire, 37½ miles from Southampton. "It is built on a flat, pine-covered heath which abuts abruptly on the sea in the form of great brown sandy cliffs." "The East Cliff, the West Cliff, the Valley, and the Coast are the four natural divisions of Bournemouth." The East Cliff, over a great part of its extent, slopes landward and thus has a westerly and southwesterly as well as a southerly aspect; it is the older residential quarter of Bournemouth. The West Cliff is more elevated and exposed than the East, and is the newer part of Bournemouth; it contains the larger number of boarding houses. The Valley of the Bourne affords the maximum of natural protection from the wind which the place can claim. The lower part is an attractive public garden, and the eastern slope, which is covered with pines, affords a perfectly sheltered, sunny and quiet promenade and resting place; the well-known "Invalids' Walk" is to be found here. The Coast is in the form of rugged high cliffs, bright

with green and yellow gorse, and broken by deep irregular chimes. Pines, much resembling those in our Southern States, are everywhere to be seen. On the East Cliff

of rain or occasional cold winds or dust. The town possesses a good drainage system, and the water supply is above suspicion.



FIG. 659.—Invalids' Walk, Bournemouth, England.

they are so abundant, fringing the streets and level walks and sheltering the houses, "that this portion of the city has been well described as a town in the wood." The heath all around Bournemouth is also covered with pine woods. The aromatic emanations from the pines are supposed to impart salubrious properties to the atmosphere. Beneath and about the pine trees the furze, rhododendron, and holly flourish in great luxuriance.

The sea lies full to the south, and on the eastern horizon are the Needles and Alum Bay, in the Isle of Wight. A pier 838 feet long extends into the sea and has specially constructed shelters for invalids. The soil, consisting of a greenish sand, is highly absorbent and very dry.

The principal facts relating to the meteorology of Bournemouth are exhibited in the following table:

METEOROLOGICAL MEANS FOR TEN YEARS, 1881-1890.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Mean temperature (Fahrenheit) at 9 A.M.	40.30°	40.70°	42.80°	49.80°	56.10°	61.50°	64.80°	63.60°	58.80°	51.00°	47.30°	41.00°	51.40°
Mean minimum temperature.....	34.40	34.50	34.90	38.50	44.60	50.30	54.20	52.60	49.70	42.90	39.80	34.60	42.60
Mean maximum temperature.....	44.70	45.80	48.50	44.90	62.00	68.20	71.00	70.90	65.80	56.30	51.00	45.00	57.10
Mean relative humidity.....	85.00	89.00	80.00	68.00	69.00	69.00	69.00	70.00	81.00	81.00	87.00	85.00	77.70
Mean rainfall.....	2.47	1.85	1.83	1.61	2.13	1.17	2.07	1.84	2.46	3.14	3.36	2.53	27.26
Mean number of rainy days.....	14.30	10.50	11.50	8.70	10.30	11.30	14.30	15.00	11.50	18.80	17.20	14.70	158.30

From the above we see that the mean temperature for the whole year is 49.7° F., or, at 9 A.M., 51.4° F. The mean minimum temperature is 42.6° F. and the mean maximum 57.1° F. The mean relative humidity at 9 A.M. is 77.7, the lowest recorded in England. The mean total rainfall is 27.26 inches, and the mean number of rainy days 158.3. On an average it has been estimated that there are about two days a week during the winter season when patients cannot go out safely in consequence

of its position, which combines the attractions as well as the wholesome influences of sea and heath. As a whole, compared with England, it possesses a mild, bright, and fairly dry climate. The atmosphere is naturally pure, sunny, free from fog, redolent of the pine, of low relative humidity, and comparatively undisturbed by high or cold winds. The soil is dry and warm, permitting patients to sit with comparative safety in the open air; and it supports an abundant and luxuriant growth of non-decidu-

ous trees and shrubs. The town area is very large in relation to the number of houses and inhabitants." On the other hand, "like other places on the south coast, it is subject to frequent and uncertain spells of bad weather, in the form of wet, cold, or both combined, and to even more dangerous, because deceptive, visitations of high east winds in the early spring."

"The kinds of cases which have been benefited by a residence at Bournemouth are chiefly as follows:

(1) Cases of pulmonary tuberculosis which would do well at any good health resort. (2) Pulmonary tuberculosis in the incipient stage. (3) Quiescent pulmonary tuberculosis when the patient can spend a number of hours continuously in the open air. (4) Patients in the last stage of phthisis often enjoy an extension of life here. In general, cases that can take advantage of outdoor life do well, while those who are confined to the house do badly. (5) Chronic bronchitis without fever, and particularly recurrent bronchial catarrh with a moderate amount of expectoration, asthma, whether neurotic or catarrhal, the different parts of the town being tried if necessary. (6) Chronic Bright's disease, particularly of inflammatory origin. (7) The subjects of chronic malaria. (8) Sufferers from chronic gastric catarrh with emaciation. (9) The victims of nervous over-work, particularly with insomnia, provided they do not settle too close to the sea. (10) Delicate persons generally, including more especially elderly and aged people, and feeble and rickety children."

"The cases, on the other hand, which do not do well or even badly, are: (1) Persons confined to the house, applying chiefly to consumptives. (2) The subjects of pulmonary tuberculosis in its active stage, especially when attended with much fever and profuse expectoration. (3) Those suffering with dry irritable catarrh of the larynx and bronchi. (4) Sufferers from neuralgia."

The accommodations are good and abundant and of every variety. From a personal visit the writer was impressed with the beauty of the place, its clear, bright atmosphere, the abundant sunshine, its luxuriant vegetation, and the striking effect of the great number of pines everywhere. The sea view from the cliffs is most attractive, and there are many pleasing excursions inland over the thickly wooded heath. For an outdoor life one can hardly imagine a more attractive place of residence.

Edward O. Otis.

BOWDEN LITHIA SPRINGS.—Douglas County, Georgia.

POST-OFFICE.—Lithia Springs. Sweetwater Park Hotel.

ACCESS.—Via Georgia Pacific Division of the Piedmont Air-Line. These springs are located in Douglas County, 17 miles west of Atlanta, 300 miles distant from the Atlantic coast and at an altitude of 1,200 feet above the sea level. The surrounding country is of a somewhat rugged, broken character, interspersed with forests of pine, oak, maple, and cypress and watered by streams skirted by haw and holly. The temperature rarely reaches 90° F. in summer or extends below 40° above zero in winter, while the nights are proverbially pleasant. The surroundings of the place are exceptionally charming, the Shoals, the Ruined Mill, Chapel Hill, and the Dome Rock, showing the mighty action of some great sea in prehistoric times, the Mill in the Glen, the Old Distillery, and the Sweetwater Creek being also among the numerous features of interest. The hotel is a first-class modern structure, capable of accommodating five hundred guests, and all of the appointments are of a superior order. While people have resorted to these springs for about sixty years, only recently have they become very extensively known.

The use of the Bowden lithia waters is particularly recommended in kidney and bladder affections, calculi, gravel, cystitis, etc., and in gout and rheumatism. The external use of the water in bathing, for which there are excellent facilities, is said to be beneficial in skin affections, chronic ulcers, glandular enlargements, etc. The

waters are used commercially, and may be found in most of the principal cities of the East and South.

Following are analyses of the waters:

Solids.	Upper Spring.)	(Lower Spring.)	Doremus, 1890.
	Pratt, 1887.	Pratt, 1889.	
	Grains.	Grains.	Grains.
Carbonic acid as bicarbonates.....	9.85	.....	9.91
Lithium bicarbonate.....	2.85	.....	4.45
Potassium bromide.....	.....	.....	1.73
Potassium sulphate.....	3.36	.....	.....
Potassium bicarbonate.....	1.69	15.23	1.47
Magnesium bromide.....	10.32	.....	.....
Magnesium bicarbonate.....	4.41	.....	.....
Magnesium sulphate.....	Traces.	.73	Traces.
Magnesium iodide (iodine).....	14.18	.....	17.25
Calcium bicarbonate.....	.....	30.21	12.15
Calcium sulphate.....	.64	.....	.....
Calcium phosphate.....	1.02	.28	1.22
Strontium sulphate.....	.21	.....	.21
Ferrous bicarbonate.....	16.25	.....	8.03
Sodium sulphate.....	133.71	124.49	121.78
Sodium chloride.....	.....	.89	.....
Sodium phosphate.....	1.33	2.61	.53
Aluminum sulphate.....	1.12	1.96	1.26
Silicic acid (soluble).....	.....	.....	Traces.
Boric acid.....	Traces.	.....	Traces.
Manganese.....	Traces.	.....	Traces.
Phosphoric acid.....	Traces.	.....	.....
Rubidium (spectroscopic analysis).....	Traces.	.....	.....
Fluorine.....	.....	.....	5.75
Loss on ignition.....	.....	.....	.....
Total.....	200.94	173.36	185.74

James K. Crook.

BOW LEG.—(Synonym: Genu Varum.) In the popular sense bow leg includes all the deformities which cause separation of the knees when the ankles are in contact with each other; but, strictly speaking, bow leg implies an outward bending of the tibia and fibula, and genu varum a deformity in which the greatest distortion is at the knee, the opposite of genu valgum. In most instances simple bow leg is associated with slight outward deviation of the knee, and genu varum with a certain degree of bending of the bones of the leg, so that the two terms are properly synonymous.

ETIOLOGY.—Bow leg is the most common of all distortions, constituting about ten per cent. of the cases treated in orthopedic clinics. It is essentially a deformity of childhood. It may be congenital, and it is not uncommon in vigorous infants who stand at an early age. But in most instances it is an effect of rickets, usually of a mild type, and it develops therefore soon after the child begins to walk, although the tendency to deformity may have been acquired before this time. It may be acquired in later life, as an effect of occupation, or injury or disease, but this type is comparatively uncommon.

SYMPTOMS.—The essential symptom of bow legs is the deformity. In the genu varum type, the femur is abducted and rotated outward while the tibia is rotated inward; and in simple bow leg also there may be a spiral inward twist of the tibia, so that in-toeing, "pigeon toe," may be one of the effects of the deformity.

In the more extreme cases, in which there is laxity of the ligaments at the knee joint, the patient may suffer from discomfort and weakness, but this is unusual except during the stage of active rickets.

TREATMENT.—There is a strong tendency toward spontaneous recovery, the "outgrowth" of deformity. But although the distortion may be entirely cured by the natural process, it is far more often simply modified and made less noticeable. This may be inferred from the fact that bow leg in the slighter degree is so common in later life. According to the writer's observations, about one adult male in five has noticeable deformity of this character, a proportion that is apparently not exceeded among children. Thus, although bow leg may cause no physical discomfort, it is, from the aesthetic standpoint, of sufficient importance to merit treatment in all cases.

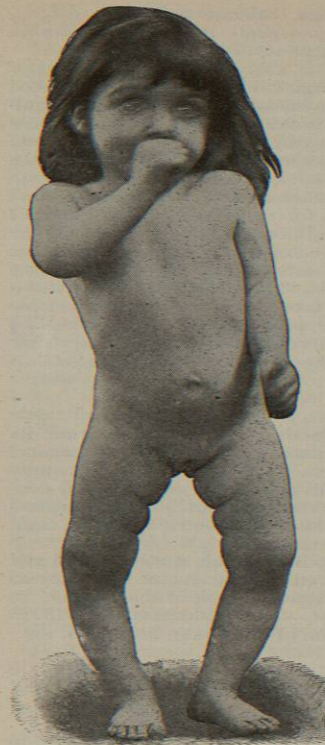


Fig. 660.—Bow Legs of the Genu Varum Type.

distortion is most marked at the knee, the bar should be prolonged to the upper third of the thigh, and a second band should be applied about the knee. A jointed brace is less effective than is the simple form that has been described.

The function of a brace is principally support. The correction of the deformity is hastened by daily systematic manual straightening, and cure is accomplished by the natural transformation of the internal structure of the deformed part which begins when the static conditions are changed. In older subjects, when the bones are more unyielding, operative treatment is indicated.

Osteoclasis or osteotomy may be employed. As a rule it is sufficient to straighten the tibia at the point of greatest deformity, but in exceptional cases both the tibia and femur may require treatment. By far the most satisfactory method is partial osteotomy, combined with forcible correction. A small sharp osteotome is inserted directly over the point of greatest deformity on the concave side of the tibia, and when the cortex on its inner surface has been divided the fracture is completed by manual force. The fibula may be bent or broken as it is more or less resistant. In all cases the distortion should be slightly overcorrected, and the limb fixed in this position until union is complete.

Other Varieties of Deformity.—Bow

leg may be easily overcome in infancy by systematic manual correction. It may be prevented in rachitic children by the avoidance of attitudes that induce the deformity, especially standing when the bones are weak. In the slight degree of deformity in walking children, the tendency toward distortion may be counteracted somewhat by making the sole of the shoe slightly thicker on the outer border. If the deformity is more marked, or if it is increasing, or if the bones are abnormally flexible, a brace should be applied. This consists essentially of a light bar of steel, reaching from the internal condyle of the femur to the sole of the shoe. This is suitably padded at the points of pressure and is provided with a laced band which is passed around the limb at the point of greatest deformity, thus supporting it and exercising slight corrective force. If the

leg may be unilateral, or it may be combined with knock-knee.

Anterior Bow Leg.—Anterior bow leg is a deformity in which the tibia is bowed with the convexity forward. This distortion is usually symptomatic of pronounced rachitis; it is often combined with knock-knee, or with general distortions of the limbs, "corkscrew" deformity. The antero-posterior diameter of the tibia is increased and its crest is prominent and projects sharply beneath the skin. As the weight is thrown upon the anterior part of the foot, the heel projects and the gait is awkward and shuffling. The distortion is not usually amenable to treatment by braces, and in the more extreme cases a cuneiform osteotomy may be

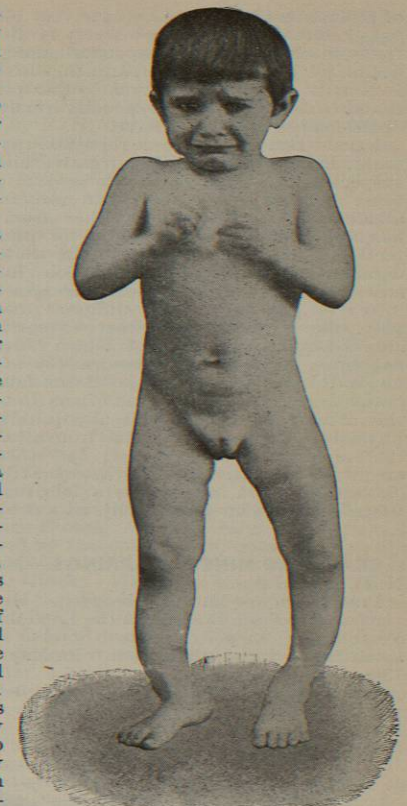


Fig. 661.—Bow Legs in Which the Principal Distortion is Below the Knees.

required to restore the normal contour. Royal Whitman.

BOX.—The leafy twigs of *Buxus sempervirens* L. (fam. *Buxaceae*). The box is a slow-growing evergreen shrub, rather variable in habit, but usually compact, with a very short trunk, and numerous leafy branches. The leaves are opposite and crowded, 2 or 3 cm. long, elliptical or oval. They are dark green and shining above, pale beneath, thick and leathery. The bark of the younger twigs is green, that of the old trunks gray and tuberculated.

Box is a native of the southern part of Europe and the East. It is frequently cultivated for ornament there, and has been a favorite bordering plant for flower gardens in the United States, where it grows fairly, but very slowly. It seldom blossoms in New England. All parts of the plant are bitter; the leaves and twigs are the most available for medicinal use. By far the most important product of this valuable shrub is its wood, which for many purposes is unequalled.

The bitterness of box is due to the alkaloid *buxine*, discovered by Fauré in 1830. It is a white, amorphous powder

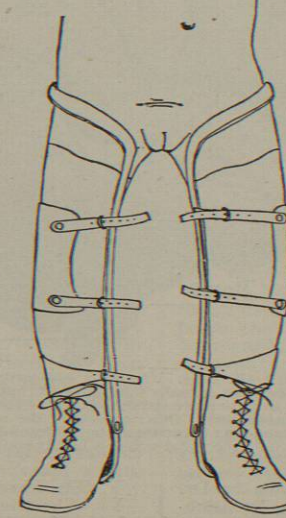


Fig. 662.—Braces for Bow Legs. (Bradford and Lovett.)