

for that purpose. The charges are not excessive. The season extends from April 1st to November, although July and August are the least desirable months in which to visit the spa.

Salsomaggiore is one of the two best-known spas in Italy, the other being Bagni di Lucca. The waters are what are known as muriated iodobromine, locally called "salso-iodic," and are furnished by numerous artesian wells. Their natural temperature is 57.2° F. For the "cure" either the "salso-iodic" or the mother water, made by extracting the salt by evaporation, is employed. The analysis of the water is as follows:

IN 1 KGM. OF WATER FROM SALSOMAGGIORE THERE IS:

	Gm.		Gm.
Potassium chloride....	0.000	Aluminum chloride....	0.0500
Sodium chloride.....	153.990	Magnesium chloride....	.0057
Lithium chloride.....	.735	Magnesium bromide....	.3037
Ammonium chloride....	.637	Iodide of magnesium...	.0663
Calcium chloride.....	15.848	Borate of magnesium...	.0116
Strontium chloride....	.256	Bicarbonate of iron...	.0778
Magnesium chloride....	5.584	Sulphate of strontium...	.0033
Iron chloride.....	.063	Silicate.....	.0230

Hot baths, mud baths, and inhalations are used in the treatment, which occupies from two to three weeks. The temperature of the baths is from 95° to 98.6° F., and the also-iodic water is generally employed, although also-iodic water mixed with the mother water can also be used. The duration of the baths is from fifteen to sixty minutes, and after the bath the patient goes to bed and rests. It is recommended that the cure be repeated again during the year, and followed up for two or three years. An after-cure in the mountains is advised.

There is an inhalation hall where this method of treatment is pursued for various affections of the respiratory tract, such as bronchitis, pharyngitis, laryngitis, etc.; for chronic eye affections, such as conjunctivitis, iritis, and keratitis; and for certain skin diseases. The diseases for which the baths are recommended are chronic rheumatism and gout; various gynecological affections, such as metritis, salpingitis, ovaritis, perimetritis, and sterility; anaemia; convalescence from protracted illness; infantile rachitis; neurasthenia; bone and joint tuberculosis; tertiary syphilis, and some forms of neuralgia and neuritis. Massage and Swedish gymnastics, electricity, and various forms of douches are also employed. The mud baths, which are given in conjunction with and apart from the baths, are used especially for rheumatoid arthritis. The mud obtained from the deposit of the tanks at the well (rich in salt, iodine, bromine, lithium, and petroleum), is applied to the affected parts as hot as can be borne, and is left on for about twenty minutes. It is then removed and generally followed by a bath of medicated water.

Besides the arrangements for baths in the "Grand Hotel," there are bathhouses (*stabilimenti*) where every precaution is taken as regards cleanliness, sanitation, and

disinfection. All laundry linen is carefully disinfected and sterilized after being used.

Salsomaggiore can be reached from London in about thirty hours. In going from Milan to Florence one alights at Borgo San Domino, and takes a half-hour's ride in a branch train to Salsomaggiore.

For a charming description of the excursions about this spa, one is referred to "Salsomaggiore and Its Surroundings," by Lady Colin Campbell.

Edward O. Otis.

**SALT LAKE CITY, UTAH.**—This city and the great region of the Salt Lake basin deserve consideration as a health resort of no mean degree, particularly as a place of residence for the consumptive. This basin of a former great inland sea, a huge remnant of which is the existing Salt Lake, has an average elevation of 4,300 feet, and is bounded on the east by a range of mountains and on the west and south by a desert. It is, then, a plateau of moderate elevation fed by the pure air from the mountains and the desert, and possessing a "maritime" quality from the presence of such a large body of salt water as the great Salt Lake, which covers an area of 2,360 square miles. Such an elevation, moreover, gives the peculiar climatic conditions incident to height above sea-level. The air is pure, cool, and dry; the sensible temperature is not oppressive, on account of the dryness of the atmosphere; the rainfall is small; high winds are absent, and the sunshine is abundant. Further, the softness of the air is a striking feature, very evident to one who first sets foot in this region, and giving a delightful sense of restfulness. The principal place of importance and resort is Salt Lake City, latitude 40° 45' N., longitude 111° 50' W., containing 53,531 inhabitants, and located 4,348 feet above sea-level. The city occupies an extensive area, is well built and attractive, with wide and well-shaded streets, and possesses an efficient sanitary system and excellent water works. The accommodations are good, there being several modern hotels. The soil is adobe. Irrigation is used, the water being carried in ditches along the sides of the streets.

"Salt Lake City," says Solly ("Medical Climatology"), "is one of the three Western cities of good size possible for the residence of those to whom a sunny climate is necessary and who desire to settle in an active business centre. The other two large cities are Denver, which shares with Salt Lake City the advantage of altitude, and Los Angeles, which is equally sunny but exposed to ocean influence."

At the Salt Lake Hot Springs Sanatorium sulphur and salt baths can be taken; and on the border of the lake, thirteen miles distant, reached by train, is the Salt Air Bathing Resort, well appointed, with nearly one thousand bathrooms. Here one can enjoy the strange experience of bathing in water containing nineteen per cent. of salt, and so buoyant that one can float in it with a

CLIMATE OF SALT LAKE CITY. LATITUDE, 40° 45' N.; 111° 50' W. ELEVATION, 4,348 FEET. PERIOD OF OBSERVATION, TEN TO SIXTEEN YEARS.

	January.	March.	May.	July.	September.	November.	Spring.	Summer.	Autumn.	Winter.	Year.
Temperature, Degrees Fahr.—											
Average monthly temperature.....	29.0°	49.0°	57.5°	75.4°	64.3°	38.6°	49.5°	71.5°	51.3°	31.0°	51.3°
Mean of warmest.....	35.7	50.6	69.3	88.0	75.4	46.2	59.5	85.3	60.9	38.5	61.0
Mean of coldest.....	20.7	32.2	47.3	63.3	52.4	28.3	39.6	60.8	39.0	24.0	41.2
Average daily range.....	15.0	18.4	22.0	27.7	23.0	17.9	19.9	24.5	21.9	14.2	19.5
Highest or maximum.....	48.8	63.9	83.3	95.0	87.5	61.4	72.9	94.7	74.9	50.4	
Lowest or minimum.....	-6.1	21.6	35.6	51.6	53.1	18.8	28.9	49.2	30.0	0.2	
Humidity—											
Average relative.....	61%	52%	45%	37%	37%	47%	49%	37%	43%	61%	48%
Precipitation—											
Average in inches.....	1.49	1.74	2.06	.53	.36	1.40	6.36	2.16	3.82	4.39	16.73
Wind—											
Prevailing direction.....	S. E.	S. E.	N. W.	N. W.	N. W.	N. W.	N. W.	N. W.	N. W.	S. E.	N. W.
Average hourly velocity.....	4.07	5.6	6.2	5.6	5.4	4.0	5.8	4.9	4.1	4.1	5.3
Weather—											
Average number of clear and fair days.....	19.8	20.5	23.7	28.3	27.3	21.5	64.4	83.3	73.2	56.3	277.2

considerable portion of his body out of water. The lake is very shallow for a long distance from the shore, and it is a laborious task to wade to deep water. The temperature of the water is comparatively high.

Standart ("The Climate of the Great Salt Lake Basin," Transactions of the American Climatological Association, vol. vii., 1890) calls attention to the fact of the longevity of the inhabitants of this region, which he attributes to the influence of the climate; and he narrates the incident of a gathering of old folks representing three per cent. of the adult population of the great Salt Lake basin, where there were a thousand people who had attained the age of seventy years or over.

Good hunting and fishing are to be had in the mountains and streams round about, and there are many short excursions to mountain resorts lying on the banks of attractive lakes. A few miles from the city, reached by an electric road, is Fort Douglas, a military post, from which is an extensive view.

From the climatic table it will be seen that the temperature partakes of the characteristics of that of elevated regions. The diurnal range is large and it does not appear to be very cold in winter or excessively hot in summer. According to Solly, the average number of days above 90° F. is 30, and below 32°, 109. The average annual range as given by Standart is 93.5°. The average relative humidity is very low and the rainfall small, indicating a very dry atmosphere. The prevailing wind is from the northwest, and the average hourly velocity 5.3 miles for the year. The number of clear and fair days is 277, which means a large amount of sunshine.

Edward O. Otis.

**SALT LAKE HOT SPRINGS.**—Salt Lake County, Utah.

**POST-OFFICE.**—Salt Lake City. Hotel and sanatorium. The springs are located in the northern outskirts of Salt Lake City. The water is conducted from thence to a sanatorium and bathing establishment in the heart of the city. This fine, commodious structure has a floor space of about fifty thousand square feet. The water, at a temperature of 112° F., is drawn from the springs through an eight-inch pipe, with a flow of about four hundred gallons per minute, and enters the establishment at a temperature of 110° F. Besides large separate swimming pools for men and women, there are twelve private pools and a number of elegant private bathrooms. A hotel and gymnasium are also connected with the enterprise in the same building. According to an analysis by H. Hirsching, analytical chemist, in 1893, the water contains rather more than three hundred grains per United States gallon of solid ingredients. This is largely composed of chloride of sodium (about two hundred grains), but the water also contains appreciable quantities of the chlorides of calcium and magnesium, the sulphates of sodium, calcium, and magnesium, the carbonate of sodium, and small amounts of several other compounds. It is also charged with sulphureted hydrogen in small quantities, as well as a considerable percentage of carbonic acid gas. The water is useful in the various ailments for which hot saline sulphur baths are prescribed.

James K. Crook.

**SALTS, DISSOCIATION OR IONIZATION OF.**—See THE APPENDIX.

**SALT SULPHUR SPRINGS.**—Monroe County, West Virginia.

**POST-OFFICE.**—Salt Sulphur Springs. Hotels. **ACCESS.**—Via Chesapeake and Ohio Railroad to Fort Spring, where carriages meet visitors for springs.

These well-known springs have been under the present management for many years, and have become justly esteemed as one of the most charming and homelike of the Virginia Mountain resorts. The location is two thousand feet above the sea level, and is surrounded by the usual beautiful scenery and wholesome climate of the Alleghanies. The hotel buildings are chiefly of brick and

Vol. VII.—2

limestone. The largest, built of stone, contains seventy-two pleasant rooms, and has wide piazzas, two hundred feet long, overlooking the lawn. The parlor and great ball-room are also in this building. There are accommodations for three hundred guests. The springs are three in number, known as the "Old" or "Sweet" Spring, discovered in 1802; the "Salt Sulphur," discovered in 1805; and the "Iodine" Spring, known since 1821. We present analyses of the Old Spring and the Iodine Spring, the former by W. B. Rogers, the latter by D. Stewart:

ONE UNITED STATES GALLON CONTAINS:

Solids.	Old Spring.	Iodine Spring.
	Grains.	Grains.
Sodium carbonate.....	.....	10.80
Calcium carbonate.....	10.26	33.00
Magnesium carbonate.....	3.31	7.00
Potassium carbonate.....	.....	2.53
Sodium sulphate.....	22.36	24.00
Calcium sulphate.....	84.90	68.00
Magnesium sulphate.....	18.21	20.00
Organic matter.....	9.24	.....
Earthy phosphates, sodium chloride, calcium chloride, magnesium chloride, iron peroxide, alumina, silica, iodine, and bromine.....	2.00	7.35
Total.....	150.28	172.48
Gases.	Cubic inches.	Cubic inches.
Carbonic acid.....	13.28	34.56
Sulphureted hydrogen.....	3.44	19.12

These are valuable waters, containing as they do a large proportion of active mineral ingredients. Both contain a sufficient quantity of the purging sulphate to render them cathartic in their effects. The iodine spring contains a fair proportion of iron and appreciable quantities of iodine and bromine, rare ingredients of sulphur waters. This water resembles those of Challes, in Savoy, and possesses alterative properties. It proves especially beneficial in scrofulous and syphilitic diseases. The waters of both of these springs are useful in abdominal engorgement, chronic constipation, chronic metallic poisoning, functional hepatic disorders, rheumatism, gout, and scaly skin diseases. Cases of bronchial troubles and early phthisis also do well at this resort.

James K. Crook.

**SALUBROL**—tetra-bromo-methylene-di-antipyrin—is prepared by the action of bromine on methyl antipyrin. It is without odor, and is used as an antiseptic dusting-powder in place of iodoform. It is said to be a good hæmostatic like antipyrin.

W. A. Bastedo.

**SALUMIN**, aluminum salicylate, Al<sub>2</sub>(C<sub>6</sub>H<sub>4</sub>OHCOO)<sub>2</sub> + 3H<sub>2</sub>O, is a reddish-white powder, insoluble in water and alcohol, and soluble in alkalis. It is employed as an astringent dusting-powder in catarrhal conditions of the upper air passages. It is known as "salumin (insoluble)." With ammonia it forms aluminum ammonio-salicylate, Al<sub>2</sub>(C<sub>6</sub>H<sub>4</sub>ONH<sub>2</sub>COO)<sub>2</sub> + 2H<sub>2</sub>O, which is readily soluble in water and is used in the nose and throat as an astringent spray or gargle. This compound is called "salumin (soluble)."

W. A. Bastedo.

**SALVATOR MINERAL SPRINGS.**—Brown County, Wisconsin.

**POST-OFFICE.**—Green Bay. This spring is the source of the Salvator Mineral Water. It does not appear to be used as a resort. An analysis by Professor Delafontaine, of Chicago, shows the following mineral ingredients: One United States gallon contains (solids): Sodium chloride, gr. 1.60; sodium bicarbonate, gr. 1.30; calcium bicarbonate, gr. 20; magnesium bicarbonate, gr. 17.16; iron bicarbonate, gr. 1.30. Total, 41.80 grains.

This analysis shows an excellent alkaline, diuretic, and mild laxative water, with ferruginous properties. It is



valuable in the treatment of acid dyspepsia, sluggishness of the portal circulation, Bright's disease, diabetes, and irritable states of the bladder and urinary passages. The water is entirely free from organic impurities, and is well adapted for table and club purposes. It has a large sale in different sections of the country. *James K. Crook.*

**SAMBUCUS.**—ELDER. "The flowers of *Sambucus Canadensis* L. (fam., *Caprifoliaceae*)." U. S. P. (but likely to be dropped from the next edition). This plant is a medium-sized or small shrub, with smooth, upright, rather simple stems, which are soft and herbaceous in the upper part. Their woody ring is very narrow; their pith very large, and much used for holding small objects for microscopical section-cutting; leaves opposite, petiolate, pinnate, large; leaflets ovate-acuminate, serrate, rarely pinnate; flowers small, in large, compound, five-branched, flat-topped cymes, regular, pentamerous; calyx minute; corolla cream-colored, urn-shaped, with spreading lobes; stigmas three; ovary inferior, ripening to a purple-black, shining, spherical, juicy, berry-like drupe, containing three minute nutlets. The elder is a common plant in moist places over a large portion of this conti-

characteristics. San Antonio (elevation 650 feet) is the chief city of this district, and is situated in Lat. 29° 27' North, about one hundred and thirty miles inland from the Gulf of Mexico. It has a population of over 50,000, composed of Mexicans, Germans, and Americans. The Mexican element presents many attractive and picturesque features, in the architecture, street life, and suggestions of bygone days in the old missions. The historic incidents connected with the life of the city also enhance the charm and fascination of the place; for there is the famous Fort Alamo, the Thermopylae of Texas.

The country is undulating, with no mountains nearer than thirty or forty miles, and the soil of the city is adobe. There is a pure water supply, and a more or less effective sewerage system. There are a number of hotels, boarding-houses, and restaurants, but the accommodations for invalids are said to be doubtful. Probably the most satisfactory plan would be to keep house in one of the more eligible suburbs of the city. There are many opportunities for outdoor life, in horseback riding, driving, etc. The climate is a mild winter one but uncomfortably hot in summer, although the nights are comparatively cool.

CLIMATE OF SAN ANTONIO, TEXAS. LATITUDE, 29° 27' N.; LONGITUDE, 98° 28' W. PERIOD EIGHT YEARS.

	January.	March.	May.	July.	Sep-tember.	No- vember.	De- cember.	Year.
Temperature, Degrees Fahr.—								
Average or normal.....	51.5°	61.9°	74.9°	83.3°	77.5°	59.0°	54.9°	68.5°
Average daily range.....	19.3	21.8	19.6	22.1	21.2	21.1	20.5	
Mean of warmest.....	62.3	73.0	85.2	95.3	89.4	71.6	65.7	79.8
Mean of coldest.....	43.0	51.2	65.6	73.2	68.2	50.5	45.2	58.8
Highest or maximum.....	81.0	93.0	97.0	106.0	103.0	88.0	89.0	
Lowest or minimum.....	16.0	21.0	47.0	66.0	46.0	32.0	22.0	
Humidity—								
Average mean relative.....	65.6%	62.1%	69.6%	64%	68.8%	65.3%	62.8%	65.5%
Precipitation—								
Average in inches.....	2.06	1.42	2.85	.92	2.84	1.30	1.82	25.27
Wind—								
Prevailing direction.....	N.	S. E.	S. E.	S. E.	E., S. E.	N., S. E.	N.	S. E.
Average hourly velocity in miles.....	7.5	8.8	7.5	7.5	6.4	7.4	7.8	7.8
Weather—								
Average number of clear days.....	10.3	9.3	8.1	13.8	11	12.1	14.2	136.2
Average number of fair days.....	9.0	12.0	13.8	14.8	13	10.3	8.1	138.8
Average number clear and fair days.....	19.3	21.3	21.9	28.6	24	22.4	22.3	275.0
Average number of cloudy days.....	11.6	10.8	9.0	2.2	5	6.5	8.3	90.0

ment, and is represented by nearly related species in many other parts of the world.

The flowers should be gathered in full bloom, and dried without heat. They then form a cream-colored or very pale yellow mass, which grows darker with time. They have a peculiar, rather agreeable odor, and a sweetish and slightly bitter taste. Their important constituent is volatile oil, with which occur resin, gum, wax, and sugar.

The use of our elder was unquestionably derived from that of the black elder (*S. nigra* L.) of Europe, which is almost exactly like it in sensible properties. The American has tufts of microscopic hairs in the forks of the branchlets of the inflorescence and in the sinuses of the calyx teeth, while the *S. nigra* has not. Elder is slightly aromatic, and when given in hot infusion is also diaphoretic. Its employment is confined almost entirely to household medication. The twenty-per-cent. infusion may be given *ad libitum*.

The flowers are the least active portion of the plant. The fruits of this and related species, though used in pastry and largely in wine-making, are laxative in the uncooked state, and have been seen to intoxicate fowls. The young buds are powerfully cathartic or even emetic, as is the bark of the root. The leaves have been used for fly poison. The bark of the stem is a useful diuretic and hydragogue cathartic, emetic in over-doses. (See also *Poisonous Plants*.) *Henry H. Rusby.*

**SAN ANTONIO, TEXAS.**—The southwestern portion of Texas is regarded as the especial health-resort region of this State, and San Antonio, occupying a central position in this region, can be taken as illustrating its climatic

From the meteorological table we see that while the winters are mild, nearly as warm as the autumn at New York City, the diurnal variation is large; and also while the summer days are hot—many days above 90° F.—the nights, as has been said, are comparatively cool. The average annual rainfall for the eight years was 25.27 inches; and for twenty-one years, 30.6 inches (Solly, "Medical Climatology"). Occasional "northers" occur at San Antonio, but they do not last long. The average relative humidity is 65.5 per cent. for the year, which, considering the high temperature, means a moist atmosphere. The average number of cloudy days during the year is 90; and the average number of clear and fair days, 275.

Such a climate as this, while it is not an exceptionally excellent one in its various characteristics, yet affords an outdoor life in the winter in a mild and pure atmosphere. For the consumptive in good general condition, and with the disease not far advanced, and who, moreover, is willing and able to "rough it" more or less, this region can be recommended. It does not, however, in the writer's opinion, possess the advantages of Southern California or of many resorts in the southern pine belt, either in the matter of climate or in that of accommodations. Almost every resort has its enthusiasts, and the following quotation from an article upon southwestern Texas by Dr. T. K. Taylor in the Transactions of the American Climatological Association, 1888, may be said to have been written by one such. "For delicate children," Dr. Taylor says, "who require the invigorating influences of moderately cool weather and active outdoor life, that climate is all one could wish during the winter season,

while the spring, with its multitude of flowers, its fragrant breezes, its genial sunlight, and its evenings with their soft sweet repose, give one a better idea of an earthly paradise than any place we have ever seen, or hope to see in this broad land."

San Antonio can be reached by three lines of railroad. *Edward O. Otis.*

**SANATORIA** (for treatment of tuberculosis). See *Open-air Treatment, etc.*

**SAN BERNABÉ SPRINGS.**—Municipality of Dolores, Nuevo Leon, Mexico. These baths, known also as the *Topo Chico*, are situated 8 km. north of the city of Monterey, to which they are connected by a railroad. The water has a temperature of 105.8° F., and, according to an analysis by Gonzalez and Lambert, it contains the chlorides of sodium, calcium, and magnesium, the bicarbonates of calcium and sodium, sulphate of calcium, silicate of alumina, silicate of lime, and sulphuric acid. The gases escaping from the spring are composed of carbonic acid and nitrogen. A bathing establishment of considerable size has been constructed and is considerably resorted to, but as at most of the Mexican mineral spring resorts the accommodations are still very imperfect and in sad need of proper development. In Monterey these baths enjoy a high reputation in the treatment of rheumatism, diseases of the skin, certain nervous affections, and menstrual disorders. *N. J. Ponce de Léon.*

**SAN BERNARDINO HOT SPRINGS.**—San Bernardino County, California. These springs are fourteen miles from Arrowhead Hot Springs. They are picturesquely located at an elevation of sixteen hundred feet above the sea level. The springs vary in temperature from 100° to 175° F. The waters have acquired considerable reputation in the surrounding district. The following analysis was made by Prof. Oscar Loew: One United States gallon contains (solids): Sodium chloride, gr. 7.46; sodium sulphate, gr. 47.63; potassium sulphate, gr. 1.34; calcium carbonate, gr. 6.23; silica, gr. 11.95; magnesium, carbonate, and ferrous carbonate, traces. Total solids, 74.61 grains.

It will be observed that the waters are saline and calcic. *James K. Crook.*

**SANDAL WOOD, OIL OF.**—(*Oleum Santali*, U. S. P., B. P., P. G.) A volatile oil distilled from the heart-wood of *Santalum album* L. (fam. *Santalaceae*).

Sandal wood is the product of a small tree of the East Indies. It has been highly valued from the most ancient times for the manufacture of objects which retain the fine fragrance of the wood for a very long time, and for use as incense. The trunk is small and its product is still further limited by the uselessness of the outer or sap wood. This is removed, either by trimming or by leaving it exposed to the action of termites, which find it agreeable and nutritious, while the oleiferous heart wood is highly offensive to them. To discriminate between these two portions, the heart-wood is often known commercially as "pink" or "red" sandal wood. This custom leads, in turn, to some confusion between this and red saunders, which is also often called red sandal wood.

Sandal wood occurs in small billets of a brownish-yellow or reddish-yellow externally and of a more decidedly pinkish tinge internally. It is very hard and heavy, and of a tough and splintery fracture, and emits, especially when heated, the characteristic odor of the oil.

The tree, on account of its very extensive collection and the careless methods employed, was long ago placed under government protection and is now cultivated upon a great scale. The distillation of the oil has also been carried on under government supervision, with the express object of preventing adulteration. In spite, however, of all precautions, such great difficulties have been encountered in securing a pure article of native distillation that many firms prefer to incur the heavy ex-

pense of importing the wood and distilling it here or in Europe. The yield of oil from a wood of first quality is said to be about five per cent. The wood itself finds no employment in medicine.

The oil is thus described in the Pharmacopœia:

A pale yellowish or yellow, somewhat thickish liquid, having a peculiar, strongly aromatic odor, and a pungent spicy taste.

Specific gravity: 0.970 to 0.978 at 15° C. (59° F.).

It deviates polarized light to the left (distinction from *Australian Sandal wood oil* [specific gravity 0.953] and *West Indian* [specific gravity 0.965] *sandal wood oil*, which deviate polarized light to the right).

Readily soluble in alcohol, the solution being slightly acid to litmus paper.

If to 1 c.c. of the oil, at 20° C. (68° F.), there be added 10 c.c. of a mixture of three volumes of alcohol and one volume of water, a perfectly clear solution should be obtained (test for *cedarwood oil*, *castor oil*, and *other fatty oils*, etc.).

Oil of sandal wood belongs to that class of volatile oils commonly denominated "terebinthinate." Like copaiba, which it resembles in many respects, it is often called a balsam, though the term is very incorrect, neither benzoic nor cinnamic acid being contained. It is said to consist almost wholly of the alcohol C<sub>15</sub>H<sub>26</sub>O and the aldehyde C<sub>15</sub>H<sub>24</sub>O.

**ACTION AND USE.**—The absorption and elimination of this oil are rapid, the latter occurring chiefly through the kidneys and the lungs, so that it might be classed as a stimulating and disinfectant diuretic and expectorant, with some astringent properties also. Its administration is frequently followed by discomfort in the stomach and dryness of the throat, and occasionally by vomiting and colic.

Disagreeable eructations and its taste are complained of by some patients, but on the whole it is less unpleasant than copaiba. Its elimination by the kidneys, which is sometimes accompanied by a feeling of tension there, changes the odor of the urine, and causes it to become cloudy with acid, in the same way as copaiba does: alcohol, by clearing up this cloudiness, which is caused by a resinous precipitate, will distinguish it from albumen. The sandal-wood products in the urine exert upon vesical, and especially gonorrhœal, inflammations a beneficial action very similar to that exerted by copaiba or cubebs. Sandal-wood therefore is frequently employed as an elegant substitute for these drugs. Reports differ widely as to the relative value, as antibleorrhagics, of copaiba and sandal-wood oils, but the preponderance of evidence appears to be in favor of the former. Sandal-wood oil is especially serviceable in recent acute cases, with considerable discharge.

The oil is frequently given dropped upon sugar or shaken up with mucilage, but is far more largely taken enclosed in gelatin capsules, either pure or mixed with copaiba or cubebs. The dose is five to twenty minims four or five times a day, and its administration should be continued for a week or so after the symptoms have disappeared.

**ALLIED PRODUCTS.**—Eight or nine species of *Santalum* are known, all natives of the East Indies. Various attempts have been made to utilize the products of several of these species, as well as somewhat similar products, though not of this genus, from the West Indies and South America; but none of them possesses the fine odor or other characteristics of the genuine, and it is doubtful if they now find their way into commerce.

*Henry H. Rusby.*

**SANDARAC.**—*Sandaraca. Resina Sandaraca.* A resin obtained in northern Africa from *Callitris quadrivalvis* Vent. (*Thuja articulata* Shaw.—Fam. *Pinaceae* or *Coniferae*), a small evergreen tree not distantly related to the cypress. The resin exudes spontaneously from the trunk and branches, and dries in tears resembling in form short, broad, blunt, simple or compound icicles, and rarely exceeding or even reaching an inch in length. They are



dull on the surface and covered by a whitish powder produced by attrition, of a glassy fracture and transparent within. Occasionally insects are found embedded in them. Upon being chewed, the tears crumble to a fine powder which refuses to become plastic, whereas mastiche, which also occurs in small yellowish, though rounded tears, readily softens into a plastic mass. Powdered sandarac, which is non-adhesive and white, with a pleasant resinous odor and a resinous and bitter taste, is called "pounce," and was formerly used to rub over the surface of paper where an erasure had been made, to prevent the ink from running when it was written over again. Either alcohol or ether will dissolve sandarac completely, while turpentine, chloroform, or carbon bisulphide only partly dissolves it.

The volatile oil of sandarac exists in very small amount, as does the unstudied bitter principle. The resin consists almost wholly of sandaracolic and callitrolic acids, about ten per cent. of the latter and between eighty and ninety per cent. of the former. Sandarac is not used at present in medicine. Henry H. Rusby.

**SAN DIEGO AND LITTORAL CALIFORNIA.**—In a consideration of littoral California we select San Diego because there are few places in the United States with a more complete climatic record; it has an uninterrupted temperature and rainfall record extending back for over half a century. This station was also among the first to be equipped with self-recording apparatus, and it has a continuous automatic record of temperature, rainfall, wind velocity, wind direction, and sunshine for each moment of time, thus giving data that are absolutely reliable. It is on account of my familiarity with the excellent records of this station that San Diego and Coronado are selected as the type in this paper, but the statements and deductions apply almost equally to the coast of Southern California.

We must study a wide expanse of country when we are considering the climatic peculiarities of the coast of this region, as the coast has a marked influence on the interior, and it in its turn markedly influences the coast; indeed, further than this, the vast Californian coast line presents three distinct climates, while on the great inland plain there is a fourth type of climate. To quote from my recent paper before the American Climatological Association (*Philadelphia Medical Journal*, October 11th and 18th, 1902), we shall barely mention the northern climatic belt, the centre of which is at the junction of the mountain chains near the northern border of California, and which embraces also the country known as Oregon, Washington, British Columbia, and the coast of Alaska and its islands. The central climatic subdivision extends from a point below this northern junction of the mountains to Point Conception on the coast. It is about here that the mountain chains, by their junction, establish a transverse line of separation, thus warranting us in describing a

Northern and a Southern California, each with its distinct topography and its very distinct climatic conditions.

Southern California, then, embraces, so far as a study of its climate is concerned, all that part of the State which lies below the transverse high mountains about Point Conception. It is with this strip of coast that we are alone concerned, from Point Conception to Coronado.

At Point Conception the coast line changes its general direction and runs nearly east, the mountains run eastward for a sufficient distance to protect the country from the north; but afterward they again turn south, thus once more protecting the coast from the desert, which is east of it.

The arrangement of the mountains and the trend of the coast are the keynote of the delightful climate of littoral California. The Alaskan current is separated from the land by the curve in the coast, and the Kurosiwo, or great Japan current, leaves the land at Point Conception and never returns. This separation is materially assisted by the coast islands which are located between San Miguel and the Coronado Islands and by those lying farther south, off the coast of lower California, the Baja California of the Mexicans.

To understand fully the factors that make the coast climate so pleasant we must consider the formation of the country contiguous to the coast. The general topography of California, more marked in the north, is a double mountain range parallel with the long axis of the State, with large fertile plains and valleys, with enormous watersheds included between them. In the south this general plan is somewhat modified. While the eastern range, the Sierras, serve as a wall to protect the country from the great arid desert plains, the coast range is much lower and no longer shuts out the sea; at some points the whole interior is quite open to the sea, so that the Santa Clara valley, the valley of the San Buenaventura River, the San Fernando Valley, the San Gabriel Valley, the valley of the Santa Ana River, the San Jacinto River, the Los Angeles River and plains, and the San Diego country constitute a great open coast land backed and protected by the high Sierras. A newcomer from the eastern country will be somewhat surprised at the designation of plains as applied to these valleys, and he will also be somewhat disappointed at their size. The first effect will probably be one of smallness and narrowness as compared with the homeland valleys, but their size is greatly increased by the hilly uplands into which they insensibly merge. This is most noticeable in the great upland plain of San Jacinto, south toward Coronado and San Diego.

As Lindley and Widney say: "The Sierra, which north of the Mojave Desert makes a great curve westward around the sound end of the San Joaquin plain of the central belt, turns southward again opposite Santa Barbara and Ventura counties, and doubling back upon its course walls in the west end of the desert, then turning directly eastward, separates the desert from the Los Angeles and San Bernardino plains. Turning southward again, it stands as



FIG. 4141.—Map in Relief of the Topography of California. A comparison of this map with the temperature and rainfall charts of the State, will show how this topography exerts an influence upon the climate of California. (From California Section, Annual Summary, 1900, of Climate and Crop Service of the Weather Bureau, by Alexander G. McAdie.)

a wall between the Colorado desert and that portion of Southern California lying west of its base." The range varies in height from five thousand to seven thousand feet.

Unlike the northern and central portions of the chain, the range breaks down in the south at several points into low passes between the coast and the interior. "The pass, by which the Central Pacific crosses the Sierra, is 7,017 feet in elevation. Yet the Soledad Pass, by which the Southern Pacific crosses the Sierra in Southern California, is only 2,822 feet. The Cajon Pass, by which the Santa Fé enters, is of about the same height. There are numerous other comparatively low passes through the Sierras at the west end of the Mojave Desert, leading toward the sea in Ventura and Santa Barbara counties, and also through the range south of San Geronimo. These passes through the Southern Sierra have a marked influence not only upon the climate of the coast portion of Southern California but also upon that of the deserts lying at the base of the Sierra."

The accompanying map in relief, prepared by Alexander G. McAdie for the California Section of the Climate and Crop Service of the Weather Bureau, 1901, if com-

pared with the statements made above and with the temperature and rainfall charts of the State, will afford a graphic illustration of the influence of the diversified topography of California upon its climate.

\*As I have said elsewhere, a great deal that is misleading has been written about the climate of Southern California. Its charms have been exaggerated and its drawbacks have either been passed over in silence or have been painted in glowing and attractive colors. The simple truth is quite good enough. It is a fact that in California of the South is to be found the best yearly climate in the world. Other localities have as good or perhaps a better climate than ours at their best, but certainly none of them has been blessed with this happy condition the year round as we have been on the coast.

A striking peculiarity, and one leading to much confusion, is the great diversity of climate in this country and the different climatic conditions which may be encountered in even a single day's journey.

At the lower stations the various climates have the

\* \* \* Two Health Seekers in Southern California." Edwards and Haraden. J. B. Lippincott Company, Philadelphia.

CLIMATOLOGY OF SAN DIEGO, CALIFORNIA.

By Ford A. Carpenter, Observer, Weather Bureau.

MONTHLY MEAN TEMPERATURES (DEGREES FAHR.) FOR A PERIOD OF TEN YEARS (1892-1901).

Year.	January.	February.	March.	April.	May.	June.	July.	August.	Sep-tember.	October.	No- vember.	De- cember.	Annual.
1892.....	55.1	55.0	56.0	57.8	61.0	62.0	64.9	67.8	65.4	62.7	60.9	54.2	60.2
1893.....	57.4	54.4	54.2	57.5	61.0	63.4	67.4	70.0	64.6	62.7	57.6	57.4	60.6
1894.....	49.5	50.5	52.6	56.4	58.6	61.4	64.8	67.0	65.9	62.8	57.1	54.8	58.4
1895.....	53.2	55.5	55.4	57.8	61.9	65.0	65.6	61.7	67.4	64.4	59.4	55.0	60.5
1896.....	55.5	57.7	58.2	56.5	62.0	64.8	68.6	69.4	66.7	64.2	59.7	59.0	61.9
1897.....	55.8	54.7	54.2	59.8	60.9	63.4	67.0	69.9	68.1	62.4	60.2	55.0	61.0
1898.....	50.8	55.2	54.5	59.1	58.8	63.8	66.7	70.6	68.5	62.3	59.4	56.6	60.5
1899.....	55.5	53.4	56.4	58.2	57.7	61.4	65.6	65.8	65.5	62.7	60.8	58.7	60.1
1900.....	57.8	57.6	59.2	56.8	60.9	64.4	67.6	68.2	65.6	63.1	64.6	60.4	62.0
1901.....	56.2	57.5	60.0	57.4	60.0	62.5	65.6	68.2	64.8	62.8	60.8	57.8	61.2
Mean..	54.7	55.1	56.1	57.7	60.3	63.2	66.4	67.7	66.3	63.0	60.0	56.9	60.6

MONTHLY, SEASONAL, AND ANNUAL PRECIPITATION AT SAN DIEGO, CALIFORNIA (1892-1901.)

Year.	January.	Feb-ruary.	March.	April.	May.	June.	July.	August.	Sep-tember.	October.	No- vember.	De- cember.	Annual.	Season of	Seasonal.
1892.....	1.58	2.96	0.96	0.41	1.15	0.13	0.00	0.05	T.	0.22	0.94	0.69	9.09	1891-92	8.65
1893.....	.78	.47	5.50	.22	.39	T.	T.	.00	.00	.11	.91	1.91	10.29	1892-93	9.21
1894.....	.29	.49	1.05	.11	.09	.01	.00	.04	.01	T.	.00	2.26	4.35	1893-94	5.01
1895.....	7.33	.53	1.43	.11	.19	.00	.00	.00	.01	.27	1.19	.27	11.33	1894-95	11.86
1896.....	1.27	.02	2.89	.25	.03	.01	T.	.13	T.	.97	.98	2.18	8.73	1895-96	6.34
1897.....	3.13	2.72	1.53	.02	.12	T.	.01	T.	T.	1.06	.02	.32	8.93	1896-97	11.66
1898.....	1.71	.06	.91	.22	.66	.02	.00	.00	.07	.00	.15	.87	4.67	1897-98	4.98
1899.....	2.34	.30	.85	.29	.10	.27	.00	.07	.00	.35	.86	.65	6.08	1898-99	5.31
1900.....	.69	.03	.53	1.26	1.45	.08	.00	T.	T.	.30	1.43	.00	5.77	1899-00	5.90
1901.....	2.08	4.77	1.07	.01	.77	.02	T.	T.	.06	.38	.41	.02	9.43	1900-01	10.45
General average	2.12	1.23	1.67	.20	.49	.08	.00	.04	.03	.46	.69	.92	7.87	....	7.93

MAXIMUM AND MINIMUM TEMPERATURES (DEGREES FAHR.) FOR A PERIOD OF TEN YEARS.

Year.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1891	76	35	70	34	76	41	77	44	67	53	73	53	88	58	85	60	89	55	84	50	82	44	72	32
1892	75	38	68	42	73	44	80	41	87	47	75	51	75	57	80	57	80	54	83	46	84	40	81	36
1893	80	38	75	40	75	40	78	43	88	49	75	53	79	57	81	59	77	54	82	50	83	40	72	38
1894	69	32	69	34	72	36	83	43	72	45	73	50	77	57	90	55	90	52	87	45	78	45	70	41
1895	77	36	82	39	74	38	81	44	80	51	77	51	74	57	78	54	90	54	84	54	85	38	79	34
1896	77	39	83	39	85	41	74	42	98	48	89	54	80	56	88	59	80	54	79	52	76	43	76	46
1897	73	40	76	38	70	40	88	46	67	50	70	54	79	59	89	60	83	58	76	51	83	45	80	36
1898	78	36	75	42	77	38	86	45	69	51	88	54	77	60	83	63	91	56	81	51	76	43	79	43
1899	74	43	76	34	86	44	83	46	68	48	70	55	78	57	76	58	82	53	83	45	81	50	80	46
1900	79	46	76	45	80	46	67	45	75	49	87	56	84	60	80	59	87	53	72	50	83	51	79	44
1901	75	40	83	44	82	47	66	46	67	51	86	53	74	57	79	58	72	56	96	51	80	49	76	35