Again, the central guide of Holt's instrument is not needed in mine: hence this split sound can be passed through narrower strictures. It is true that, by doing away with the central guide, we lose Smyly's addition of a catheter to the dilator, whereby an unskilful operator may be satisfied that he has kept the true path to the bladder, and not diverged into a false passage. But this advantage is not practically a great one in actual use. The fine tube often gets blocked by mucus; and the operator seldom needs to see the urine flow to be assured he has passed through, and not by the side of, a stricture.

The third and chief advantage is this—diminution of resistance. The force needed for Holt's dilator is sometimes very great; indeed, I have seen his instrument break in the most skilful hands from this cause. Much of the power is required to overcome the continuous friction of the tube, both inside along the guide and outside on each half of the split sound. It is true that the necessity for excessive force has been overcome by screwing down the dilating tube; but what seems to me a very important point in Holt's plan of treatment is thus lost—namely, rapidity. The slowness of a screw fails to completely break through all the indurated tissue: part is only stretched, and soon contracts again. In the dilator before you, the friction-surface is reduced to these two dovetail grooves, which together do not measure more than half an inch. The rapid application of the wedge to the stricture is obtained by a force so small, that one hand has hitherto sufficed to overcome the resistance.

It is not my intention to occupy your time in discussing the relative merits of treating stricture by suddenly breaking through the patch of induration which causes it, and of slowly dilating by repeated passage of bougies. This question has been recently debated by the profession. Mr. Holt's plan is proved and acknowledged to be a safe, easy, and speedy mode of treatment. There are, however, two points which have not yet, so far as I am aware, been much insisted upon. Nevertheless, I am supported in my opinion by that of my teacher and colleague Sir Henry Thompson. Rupturing the tissue is not applicable to penile strictures or those anterior to the bulb. Here incision is preferable, because the new matter abundantly produced to repair the rent often blocks up the spongy tissue so much as to prevent or impede erection beyond the point ruptured. A clean internal incision does not cause the same amount of plastic formation, and hence subsequent erection is not interfered with after this mode of division.

The second point is this: No. 12 is rarely large enough to split all the fibres of a stricture; some are only stretched, and contraction returns as soon as after gradual dilatation. Hence I have carried the size of the cone to No. 16 for urethras where the calibre naturally approaches No. 10 and No. 12.

The instrument is only just out of the maker's hands; hence my experience is limited to four cases, in all of which the urethra has been fully dilated; the patients have had no bad symptoms whatever, and they have been detained in bed only a few hours.

CASE I.—M., aged 28, was admitted to University College Hospital July 15th, 1871. Difficulty in passing urine had been noticed three months. A No. 4 olive bougie stopped at six inches. The dilator with No. 14 cone was passed under chloroform. The stricture yielded at once. There was pretty free hæmorrhage. No instrument was introduced after the dilator was withdrawn. On July 16th, urine had passed very well the previous night, and the patient slept all night without any opiate. On July 18th, I passed a No. 12 probe-ended catheter, and drew off the urine. He attends twice weekly to have a bougie passed, until he can pass one himself.

CASE II.—J., aged 31, a horsekeeper, was admitted to University College Hospital July 20th, 1871. Difficulty in passing his urine had been felt for twelve years, and the patient had several times been relieved of retention at this hospital. At $4\frac{1}{2}$ inches, a stricture was found, through which, after some difficulty, a filiform bougie, about No. $\frac{1}{4}$ in size, was passed and tied in. For micturition, the patient was twice compelled to withdraw the bougie, but replaced it himself. On the 21st, a $\frac{3}{4}$ catheter was passed and tied in. On the 24th, the dilator was passed with the No. 16 cone. Very little hæmorrhage took place, and by a No. 13 catheter the urine was drawn off. On the 26th, the No. 13 catheter was easily introduced, and the patient is now learning to pass his own instrument regularly.

CASE III.—August 27th. A gentleman since 1867 had kept his stricture dilated by the occasional passage of No. 10 and 11 bougies. Notwithstanding this, an abscess ending in perineal fistula formed in 1870, which apparently healed, to break open again with abscess three times, though the patient had been careful after each abscess to draw off his urine regularly through a catheter. This being his third attack, the patient begged me to do something to prevent its recurrence; and on August 2nd, Dr. Squarey giving chloroform, I burst the stricture by the No. 16 cone, and passed afterwards a 16 pewter sound to the blad-

der. No bad symptom occurred. There was very little pain in passing urine the first time; none after that. No. 13 passed easily on August 4th and 6th.

ON THE PHYSICAL GEOGRAPHY AND CLIMATE OF SPAIN, AND OF ITS HEALTH-RESORTS.*

By JAMES HENRY BENNET, M.D.,

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IN order to understand the climate of Spain, it is absolutely necessary to be acquainted with its physical geography. The peninsula of Spain is constituted by a plateau or table-land, upraised some two thousand or more feet above the sea, and intersected from east to west by a series of mountain ranges all but parallel to the Pyrenees. The principal of these mountain ranges are the Sierra Guadarrama, the Sierra Toledo, the Sierra Morena, and the Sierra Nevada. The table-lands between these ranges were formerly the beds of seas, of estuaries, and of fresh-water lakes, and are now traversed by rivers, in a direction parallel to the mountain ridges, which empty themselves into the Atlantic or Mediterranean. All the larger rivers, with the exception of the Ebro, direct their course to the Atlantic.

The main mountain chains of Spain are of primary formation, and constitute the basis of its geology. They emerged before the secondary strata which surround them, and are formed of granite, gneiss, crystalline schists, etc. Secondary rocks, represented by the trias triple, and also by the jurassic and cretaceous formations, occupy a vast area in the eastern and southern regions of Spain. In the table-lands, plains, and river-valleys, are found tertiary, old and recent, nummulitic rocks, as also miocene and pliocene formations. Fresh-water miocene fossils are found at an elevation of two thousand five hundred feet, which shows how greatly the peninsula of Spain must have been raised in comparatively recent geological times.

Below this central table-land of Spain is the coast, sometimes a mere ledge or undercliff, like the Undercliff in the Isle of Wight, or the Genosse Riviera, but often presenting small alluvial plains of greater or less width, watered by rivers that descend from the mountains, and from the elevated plains of the interior.

Thus, Spain may be compared familiarly to a square dining-room table, with a narrow ledge of coast on the floor. Of course the climate of the upraised mountainous table-land, and that of the subjacent coast, must be, and are, very different. Although Spain lies far south, between the thirtieth and the forty-fourth degrees of latitude, an elevation of two or three thousand feet does not protect its interior from intense scorching heat in summer. The city of Madrid, which is two thousand seven hundred feet above the sea, in midsummer is one of the hottest and most burnt up cities in southern Europe. But this altitude, combined with the parallel chains of huge snow-covered mountains, gives in winter to central Spain nearly as low a temperature as that of northern Europe. That such is the case is evidenced by the vegetation, which is not more southern than the vegetation of the less favoured regions of England.

The coast-line, especially the south-eastern coast-line, presents very different physical conditions. Bathed by the warm Mediterranean Sea, exposed in full to the powerful south-eastern sun, protected from the north north-west and south-west winds by the entire bulk of the mountain land of Spain, it is really a southern region, as its vegetation testifies. There are other influences which tend to modify its climate. It is all but a rainless tract, and certainly the driest region in Europe. I have never met with a thoroughly satisfactory explanation of this fact, which most observers and writers announce without trying to explain. I was in Spain in May 1868, and previously to entering that country I had carefully explored Algeria, from Fort Napoleon in the east to Oran in the west, and from Algiers to the margin of the Desert of Sahara. The meteorological conditions there existing and recognised gave me, I believe, the key to this paucity of rain on the east coast of Spain.

The presence of the Pyrenees and of the mountain chains of central Spain at once explain the absence of rain on the eastern coast, with north, north-west, and even south-west winds. The rain-clouds are arrested in passing over these elevated regions, and their moisture is squeezed out. But why should not the north-east and south-east winds, which so frequently reign in the Mediterranean, and which pass over vast tracts of water before they reach the east coast of Spain, bring their burden of rain to the mountain-fringed shores of Spain? I be-

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lieve that the explanation is to be sought for in Africa, in the Desert of Sahara. This immense tract of sunburnt sand, which covers a considerable portion of the continent of Africa, may be considered one vast furnace. The atmosphere heated on its surface is constantly rising up into the higher atmospheric regions, and thus creating a vacuum. To fill this vacuum, the Mediterranean winds, north, north-east, and east, are pulled down before they reach the coast of Spain, probably within fifty or a hundred miles of it. Thus diverted, they pass over the Algerine or Mount Atlas Switzerland; there deposit their moisture, making it in winter and spring a moist verdant region, to lose themselves in the great sandy desert.

That the boisterous winds which make the western Mediterranean so troubled a sea in winter, are thus diverted, is certain. The coast of eastern Spain is proverbially a calm sea. At Alicante there is a saying that their sea is "a sea for women and children." The steamers from Marseilles to Algiers pass between the Balearic Islands, about seventy miles from the mainland, and constantly in winter they have to contend with very bad weather. As constantly do they escape from it by steaming east to the Spanish coast. This is so much the case, that a detention on the Spanish coast going or coming from Algiers is a common, at some seasons a regular, incident of the voyage.

Whatever the explanation, the fact is certain that from Malaga to Barcelona, on the east coast, there is very little rain, not more than forty days in the year, often not that—much less than on the Genoese Riviera, also an exceptionally dry region. The winter temperature is also so exceptionally mild that there can never be more than a few degrees of frost, as evidenced by the flourishing existence of orange and lemon trees, of subtropical palms, and of other plants which cannot stand more than a few degrees of winter frost. I only found, however, at Malaga, flourishing in the open air, the cool stove plants, heliotropes, lantanus, pelargoniums, etc., which I and my neighbours grow in our gardens, unprotected, at Mentone and in the more sheltered parts of the Riviera. At Murcia and Valencia, these plants were grown in pots and placed under cover in winter. The conclusion which I legitimately draw is, that the winter temperature is as warm, indeed a shade warmer, at Malaga than at Mentone, but that, on the rest of the Spanish coast, the winter temperature is rather lower than at Mentone and the more sheltered regions of the Riviera. The climate, soil, and vegetation are, however, the same in both regions. Medically speaking, therefore, they are suited to the same morbid states, to all who require a dry, sunny, bracing, stimulating, mild winter climate. Malaga would, thus, be one of our most valuable resorts were it not for its filthy, unhygienic state, which renders it unfit for the residence of a healthy, and still more of an unhealthy person. Although most sincere in the expression of my convictions on this score, and most anxious to be impartial, it may be thought that a prepossession in favour of my winter home makes me a prejudiced witness. I therefore refer to the testimony of Dr. Madden, an enthusiastic admirer of the climate of Malaga. In a pamphlet entitled *The Climate of Malaga in the Treatment of Chronic Pulmonary Disease*, Dublin 1864, he says very graphically, and very explicitly:—

"The hygienic condition of Malaga is as defective as it can well be. In a great many of the houses there is no provision for sewerage of any kind; and even in the more civilised part of the city, in the hotels on the Alameda, the drainage is very bad indeed. The main sewers, which run under the principal streets, are choked up by the decomposing accumulation of years, and, being provided with immense square openings through which the dirt and rubbish is thrown into them, in the centre of the streets, the mephitic gases evolved below freely escape into the atmosphere of the narrow lanes of the city. The bed of the Guadalmedina is really the main sewer of Malaga; and as for nearly ten months annually it is little more than a wide dry bed of gravel, being dependent on the torrents in winter for its purification, the odour it exhales in warm weather renders a residence near it as disagreeable as it is unhealthy. The connexion between epidemic disease and bad sewerage is, I think, very well illustrated in Malaga, which has at all times been remarkable for the prevalence of zymotic disease. I have collected from the older Spanish writers notices of no less than twenty-two epidemic pestilences, some of which almost depopulated [the city between 1493 and 1804]. The earlier of these seem to have been epidemics of genuine Oriental plague, and the latter generally assumed the form of yellow fever. Of late years, since 1834, these pestilences have not appeared, but their place has been taken by Asiatic cholera, which has several times ravaged the town."

Such is the description of this favourite resort for consumptives, given by Dr. Madden, himself an ardent supporter of it. May I not ask, in cool, sober, common sense, whether it is not sheer insanity to send miserable invalids, young and old, already stricken with disease implying decay of vitality, lowered organic power, to a town where the de-

fective hygiene of the cities of the middle ages reigns supreme; where filth-engendered pestilence stalks abroad day and night, as in former days; where the Oriental plague is succeeded by yellow fever, and yellow fever by Asiatic cholera?

There are other towns on the east coast of Spain—Murcia, Elche, Alicante, Valencia, Seville—but in none of them is there any suitable accommodation for invalids. The hotels are merely inns of a third or fourth class, frequented by, and supported by, commercial travellers, and situated in the middle of these unhealthy cities. Tourists can put up with them, but they are not fit for real invalids. In the course of time, commercial enterprise will no doubt provide suitable accommodation in this really good and favoured climate of the east coast of Spain. But in the meanwhile, real invalids, who require a dry, bracing, sunny, mild, winter climate, had better keep to the Genoese Riviera. For further details on the subject of this paper, I must refer to the last edition of my work on the *Winter Climate of the Mediterranean*.

METEOROLOGY AND CLIMATE OF PLYMOUTH.*

By J. MERRIFIELD, Ph.D.

MR. PRESIDENT AND GENTLEMEN,—Believing as I do that climate and health are very closely interwoven, I must urge this as an excuse for bringing forward the subject of the meteorology and climate of Plymouth; and, as I am unaware of any other consecutive registers of meteorological phenomena kept in the neighbourhood, I beg to offer to the Association the few deductions I have drawn from my own observations, although I could wish this honour had fallen into abler hands.

In speaking of the climate of any place, I must guard my hearers against using that term indiscriminately with weather.

Weather expresses the condition of the atmosphere at any particular time in a certain place.

Climate means the condition of a country with regard to its meteorological phenomena generally, or it is the mean or average of all weathers taken for a very long period. Weather is changeable; climate is uniform. Time enters as a factor in weather; from climate time has been eliminated. "Climates are different in different places; whereas the weather, though changeable in any one place, may be the same at the same time in many places."

My recorded observations extend over about seven years; viz., since October 1864, and the deductions I may draw should be received with all the caution due to the short time during which I have registered systematic data. Then, again, by using check instruments I have found reflected heat where I little expected, and hence sometimes too high a maximum has been recorded; and at others I have left thermometers exposed by night, when by radiation under a cloudless sky, with a small amount of vapour in the atmosphere, I have registered too low a minimum. As an instance of this, I have several times found ice formed on the top of my house, when a screened thermometer in the open air close by has not sunk lower than 35 deg. Fahr. The material of which the screen is composed, the colour of the paint used, and a countless number of so-called trifles, tend to introduce discrepancies between observers who are otherwise as careful as it is in man's nature to be. Again, among observers I believe proper allowance has not been made for the character of the soil near which observations have been taken: thus on Dartmoor, near the peat-bogs, the heat from the sun is absorbed by the black marshy soil, and is at once transformed into what scientific writers of the present day call "potential energy", by converting the water into vapour; but I have become sunburnt on the moor, when a shaded thermometer there has stood many degrees below one under similar circumstances in Plymouth, where the sun's heat has been reflected and radiated from our lime-stone soil. No doubt part of the effects of the direct rays of the sun was due to the small amount of vapour in the atmosphere on the high ground of Dartmoor, whilst in the air at Plymouth more vapour is found.

I have felt bound to make these introductory remarks; because, if any observer compare his observations with mine, attention to little matters may reconcile many apparent discrepancies.

In comparing my observations, I find the mean temperature of Plymouth to be 52.31 deg. Fahr. This mean would obviously be best found by recording for a long period twenty-four hourly observations and taking their average; but Mr. Buchan, the Secretary of the Scottish Meteorological Society, has shown that the mean between the maximum and minimum between every day in the year is too great only by a frac-

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