Thesis
On the High Altitude Treatment of Pulmonary Mononiasis.

by George Daniel Smith, M.B. & Ch.B., Edinburgh, 1875.
Before proceeding to consider the High Altitude treatment of Plltyria, I propose to devote some pages to the varieties, causes, and pathology of the disease.

Varieties of Plltyria:

Plltyria Pulmonalis may conveniently be divided into five varieties, though one form in such a division will frequently be found merging into another:

1. Simple Plltyria: the disease commencing with inflammation, generally Catarhhal, and going on to Cavernation & Incarvation.

   Note: Dr. McCall Anderson "Discussion on Pathology of Plltyria of Pulmonalis" at Glasgow, page 45.


   Memos on Practice of Physic Vol. I, p. 207 et seq.

   Bartholomew's Practice of Medicine p. 281.

2. Pneumonic, complicated sooner or later with tubercle (note Addison in Jones & Livingw's Work p. 504) the period of this complication being comparatively short, except in the more chronic, but difficult to impossible, to describe in this state. (Note: McCall Anderson "Discussion on Pathology" page 45.

3. Simple Fibroid Plltyria: a chronic indolent inflammatory affection of the lung, uncomplicated by tubercle, treated generally by inhalation of irritating particles and resulting in hyperplasia, contraction of newly formed connective tissue, causing bronchiectasis, cavities and suppuration.

   Note: Dr. Joseph Coakley "Discussion on Pathology" p. 13 et seq.

Remarks on the Pathology have been omitted in copying over.
4. A carcinosis of the lung complicated with tubercles. Cases we naturally may be present, either secondary to a Carcinomatous process (Parikson's Med. J. p. 63) or due to degeneration of tubercles.

5. Inflammatory Phthisis. (Lewin & Westcork p. 50. and Berndt p. 359. 7th.) in which the disease commences with a deposition of tubercles (Pinney's Med. J. p. 207) which, if not limited to the pulmonary tissue, are but sparsely distributed in other organs. As inflammation results from the presence of the tubercles, this variety in its later stages comes very closely to resemble the second.

The first and third varieties above named would be included under Professor Craig's third division of Inflammatory Phthisis, whilst the fifth agrees with his division Tubercular; and the second and fourth would together constitute his Mixed forms.

Dr. McCall Anderson, in his discussion on Pathology already alluded to (page 457) mentions Acute Tuberculosis as a variety, but this term is generally understood to mean a general, and not a local disease, would therefore he more appropriately considered with Constitutional Affections.
Causes of Phthisis.

It is upon a correct appreciation of the cause of Phthisis that right views as to the treatment, especially Preventive, will depend.

In the first place the disease must be considered as hereditary; some, as Hamilton, hold that only the tendency to it is inherited, because the children of phthisical parents are not born phthisical, that is, because the disease, with rare exceptions, is not congenital; but inherited Syphilis is not always apparent at birth, and that, with which the hereditary character of Phthisis is more comparable, does not usually exhibit its symptoms till after middle life.

Vide Dr. Holmgren. Discussion on Pathology, p. 40-41.

Pulmonary Consumption is closely associated with Scrofula, a constitutional state which not only predisposes to it, but is in many cases, indirectly, its actual cause, doubtless by developing the "causes incitant" or "tubercular Virus".

It is to be noted that the Causes of Scrofula are also the causes of Phthisis, viz.: bad hygiene, Conditions and food, deficient in quantity or defective in quality, &c. And that the relations of the influences causing Scrofula be carried further, Phthisis will, as a rule, ensue, better in the persons so influenced or their Offspring. Nevertheless, a Community may be marked by Scrofulous and yet Phthisical rare, as among the Slavonic residents of the Galician district of Zolkiew, who live on large quantities of food, mostly vegetable, only slightly nutritious, and in whom the "Causes of Consumption" appear 53, 54, 71.
abdomen, in consequence, attains an enormous size.

In connection with this fact may be added the frequent
appearance of phthisis during pregnancy, and also the fact
that in Upper Siberia, where the majority of the adults
suffer from enlarged spleens as the result of Agee,
Professor Virchow found no case of phthisis.

In all these conditions we find an enlarged abdomen
pressing on the diaphragm, and the first-class of cases
seeming to suggest an influence as to neutralize the pre-
disposing action of Serejula, probably by increasing the
frequency of inspiration and hastening the circulation
of the blood through the lungs.

It is most interesting to observe that, in Peru (at an
elevation of nearly 10,000 feet) in Ecuador, Serejula, ac-
ceding to Professor Dornec of Lima, is so common as
to give a peculiar character to surgery, and gel-
phthisis is practically unknown: at such elevations
also, as is well known, the frequency and depth of respira-
tion, and rapidity of pulse rate, are normally increased.

Among other Facts Hygienic Conditions may be
mentioned the comparative absence of sun light, living
in dark, damp rooms and an impure atmosphere,
especially when due to overcrowding, in consequence
of which the same air laden with exhalations from
lungs and skin is aspirated over and over again, inducing
anemia and exhaustion, and lowering the tone of the
Nervous system, though perhaps few would go so far
now as Dr. Henry MacCormac of Belfast, when Rep-
ten years ago he wrote: "Wherever the air habitually

respired, has been inspired in whole or in part before, these tubercular deposits are found, and whereas the air habitually inspired, has not been inspired, in whole or in part before, these tubercular deposits are impossible, and consumption and scrofula are unknown."

The conditions and necessities of the internal atmosphere play an important part, especially the force of the wind, humidity, and variation in temperature. A direct relation has been ascertained to exist between the amount of consumption in a locality and the humidity of the air, both in the United States and in England; the large towns of Scotland also are said to have been visited with Pottis according to the dampness of the atmosphere of each, and the percentage of deaths from this cause (if I mistake not) is stated to be least at Inver, to increase towards the west, and to be greatest at Greencock. As an example of the rainfall in the west as compared with that in the east of Scotland may be mentioned the fact that in February 1882 the rainfall at Greencock was 6.31 inches as compared with 0.3 inch at Aberdeen.

Much moisture in the atmosphere gives the sensation of a lower temperature than actually exists, and it is rather to this quality than to intense cold that the feeling of shivering is often due.

Winds of medium or low temperature, taking the cutaneous vessels of delicate persons, as it were, by surprise, cause rapid lowering of the bodily temperature before the infected person's appetite is able to secure combustion.

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*Consumption &c., by H. MacCrean M.D. 1865. 2nd Ed. p. 28.

**Listed from Notes taken at Lectures by Prof. Mac Cuspin in 1872.

of these vessels, to produce a condition which may be, either directly or indirectly, the result of nasal passages being obstructed and the pulmonary structures.

A combination of damp and wind is, of all, the most frequent external or exciting cause of pulmonary troubles; great and very rapid alternations of temperature are similarly to air in rapid motion, but these conditions are more under one's own control. Indeed, cold associated from wind and damp, of its own properties, would appear to act beneficially in the majority of cases of pulmonary actual or threatened.

The origin of the disease among the Zulus is matter of interest: Consumption is, I am informed, a good authority, was quite unknown among this race until European clothing was introduced among them. Formerly their custom was to avoid themselves all men with fever and, as a rule, to wear simply a blanket, which during rain was carefully packed away into a leather bag made out of the skin of a chief. A stick down the back serving for a month, and so kept dry until the rain was over, when it was again warmed by the wearer, upon whose gummy skin the rain had taken little effect, and no harm resulted. Recently, however, being possessed of both European cloth, persons to damp, and less easily disposed of on the approach of rain, the Zulu has now become liable to pulmonary, and it is to be feared that the pulmonary affection may thus be transmitted to posterity.

*Fufferal's Handbook of Treatment - page 339.
**Rev. Mr. Chalmers of Grahamstown, South Africa.
We do not know whether there is, or is not, in our atmosphere a micro-organism worthy to be named a tubercular germ, which finding a suitable niche for its development - in a peculiarity of constitution such as the pulmonary, or in a serpulous cataract, is capable of producing the so-called "tubercular virus" and so giving rise to General Tuberculosis or to Tuberculosis Pneumonica.

Consumption has for long been found more common in persons bearing long necks, long slender chests, and wide chest inter-spaces; and Richter found this internal configuration to be associated with small vessels, heart and main vessels, and large lungs. Dr. Abernethy of Edinburgh* has endeavored to show that this internal condition favors the development of phthisis. He argues that slowing of the circulation, blood stasis, and frequent attacks of inflammation consequent thereupon, are in such persons the result of feeble cardiaque impulse, combined with a subdivision of the pulmonary artery into an unusually extensive network of capillary vessels**. In addition, it is adduced that the apices of the lungs have a more limited range of movement - than their middle and lower parts during inspiration, and that the upper and posterior movement - implies a further slowing of the blood stream through the pulmonary capillaries, for then there is the resulting passive hyperemia, one reason why the disease usually begins in the apices.

** Source on Consumption, page 44 et seq.
The question arises as to the communicability of Potties: Is Consumption Contagious?

Sir Thomas Watson, more than thirty years ago, answered this question in the negative, but at the same time deprecated the healthy occupying the same bed, or even bedroom, as the Consumptive. *Dr. Cotton* + found that during many years only one case of phthisis could be traced to Contagion in the Hospital for Consumptives. Bartholow is inclined to give an affirmative answer, since many cases seem to have to support such a view. I think it cannot be denied that the breath of an advanced Consumptive patient contains excrement in it "infective" particles of caseous or tubercular matter. And considering that dogs, which breathe air through their pulmo-venous tubercular tissue was diffused, because affected with pneumonia tuberculous (which subsequently spread to other organs), it is only natural to conclude that at least some cases of tubercular phthisis owe their origin to Contagion.

Allusion may, in passing, be made to the irritating effect of various kinds of dust in inducing Carcinoma of the lung or Tubercous Phthisis; to the influence of Tuberculous Pneumonia as a factor in the production of Caseous Phthisis; and to the effect of "protracted Mental Austerity, there which", according to Sir Thomas Watson, "its single cause, perhaps has been power to "

[References]
2. *Tuberculosis, p. 82.
3. *Bartholow, p. 32.
5. This view is supported by the recent discoveries of Dr. Nettleship.
Pulmonary Haemorrhage, as a Cause of pleurisy, is a subject of much dispute; probably blood, sucked into the alveoli from the bronchi, on account of its intimate admixture with the air of the former contained therein, may, in a susceptible subject, cause and give rise to the disease, and a case recently related by Professor Gairdner seems to support this view: the more general opinion, however, is that the haemorrhage itself is due to the pre-existence of an as yet undiscovered pleurisy.

It is, however, abundantly evident that Pleurisy Pulmonalis is not due to one Cause; there may in any particular Case be several Causes acting together, with literally equal force, or there may be one main exciting Cause combined with one or more predisposing Influences.
High Altitude Treatment of Pulmonary Tuberculosis

In considering the suitability of a high altitude climate to the treatment - preventive, palliative, curative - of pulmonary consumption, it is necessary to have in view the various causes of the disease: general local, internal, and external, and to ascertain whether, or how far, these causal influences are counteracted by the normal conditions met with in such regions: also whether there are any contraindications to the employment of this method in the treatment of all, or any particular cases of this disease; and further, whether any means should be adopted as the whole or only as part of the treatment employed. Thus, in the treatment of each case we should endeavour to counteract hereditary predispositions, to improve the general health, to eradicate that constitutional condition known as Sterility, to supply hygienic surroundings of the most satisfactory character, including abundance of sunlight, to bring our patients into a pure, tonic atmosphere free from fogs, mists, damp, and chilling winds and sources of further irritation & infection, and to place them where, if possible, their minds may be free from business cares & mental anxiety.

The Chief High Altitude Stations best known to British physicians are perhaps the following:

Davos Platz, in the Canton of Grisons, Switzerland, at an elevation of 5,200 feet above sea level, and surrounded by wooded mountains: there is among
The native inhabitants, an absence of Equator, distance & view; Longjula, if present at all, must the case; by some it is said that Paliaris is hot in winter, but this is denied by others. Indeed, Dr. Henry Bennett, quoting from Dr. Innes Müller (on the Statistics of Paliarac, Mortality in Switzerland) states that the mortality from this disease at elevations above 5,000 feet is 4 per cent. The climate of this "Cure-place" will be specially alluded to hereafter.

The upper Engadine, also in Switzerland, possesses characteristics which on the whole are similar to those of Davos: it is, however, less sheltered and more liable to storms. The chief resorts in the Engadine are Scamadina and St. Moritz, the former being 5,700 feet, and the latter 6,084 feet above sea-level; St. Moritz is the highest valley in the upper Engadine and here the atmosphere is extraordinarily dry, arid, clear, and the sky of a deep blue colour; the temperature, it is said, rises in summer to 66° Fahr. in the shade, but a fall of 35° Fahr. within the twenty-four hours is not uncommon; in winter the thermometer frequently falls to 30° Fahr. below zero; while frost and snow are by no means uncommon in August.

In India, the hillstations of the Himalayas & other mountain ranges at elevations of 5,000 to 7,000 feet are cool and bracing health resorts, frequented by Europeans.

In Africa are the South African Uplands, with an elevation of from 3,000 to at least 4,000 feet, including Bloemfontein which would appear to be an excellent high altitude resort for phthisical patients, to whom the cold of Davos is unsuitable. Regarding this region, and its influence on phthisis, more exact information is needed.

In the New World are Mexico and the elevated districts of Central America.

Luito, in Ecuador, a town of 70,000 inhabitants, is almost on the Equator, and at an elevation of nearly 12,000 feet, the snow line being about 7,000 feet higher. Here with doors and windows open day and night, the temperature is found to vary all the year round between 37° Fahr. and 65° Fahr., fires are not essential to comfort; people live, as it were, constant in the new air; poverty, destitution and vice abound, and leprosy is very common; thus showing many contrasts to Davos, yet phthisis is practically unknown. In cases imported from the adjacent sea-coast towns, the further progress of the disease is generally speedily arrested. (Unfortunately, between Great Britain and Ecuador there intervened, not only a long sea-voyage, but also tedious troublesome journeys overland up the mountain slopes, attended with many hardships, requiring some powers of endurance.)

The above remarks tend to dispose the statement made by Dr. P. Cheneau of London) that we cannot reside either a high site for phthisical patients in a tropical or hot climate.

Whether or not the climatic & other influences of Davos
lead to the majority of cases in the several directions in-
dicated on page 10, may be inferred from their effects on the
Dynamics, the Metabolical, social & other conditions
found to exist there, and the results already attained
by this method of treatment. These effects, conditions,
results, I had, during a residence of nearly 6½ months,
(Winter 1878-79) some opportunity of observing, and
the following remarks will be drawn partly from my
own notes & partly from the observations of others, es-
specially those made by Dr. Theodore Willams, who resided
Davos during the same season, and Dr. Eichler, one
of the resident physicians.

Davos-Platz is situated at an elevation of (or nearly)
5,000 feet, and lies in a valley receiving N.N.W. & S.S.E.,
well sheltered except towards the South East.
The Barometric pressure is very low, ranging generally
from 24.02 (as on Feb 23, 1879) to 23.37 (as on Dec 19, 1879)
as compared with 29.60 at Greenwich, thus evi-
dencing considerable atmospheric rarefaction.

From the Thermometric Observations, the atmosphere (dur-
ing the earlier months of the season 1878-79 at least)
does mark a dryness, conferring a comfortable rec-
novation of warmth at a low temperature: the average
percentage of humidity for the Winter 1878-79 was 63, and
that for the following winter 1879-80, 62. Occasionally, the
percentage falls very low, as for example 6-40 in January
1880.* 100 F. Fahrenheit finds that taking a -

as the average temperature at Davos and at Caunes was respectively (44°, -2.3° C. and +8.7° C.) a cubic metre of air at the former would contain about 2.85 grammes of moisture, as compared with 3.42 grammes at Caunes.

The Solar Radiations, as shown by the black-bulb thermom
eter, is very great, having in February 1879, reached 166.5°. This appears to have been the highest point registered from 1876 to 1880 (both inclusive). Some interesting Comparisons of Davos with Caunes and Greenwich are given by Dr. Williams in the Lancet for August 9th, 1879, p. 192, showing the greatest Solar Radiations to have existed at Davos, and the least at Greenwich: the Comparison is made from Observations taken during the four winter months of 1878-79.

During March, the temperature at night, as also frequently during the day, in the shade, is very low, leaving on the naked (or rather early morning) following 3rd January 1879, Jaller as low as minus 7.5° Fahrenheit, indicating nearly 40 degrees of frost; the maximum shade temperature on the 5th being 22.5° Fahrenheit, and on the 6th, 19.4° Fahrenheit; the black bulb thermometer standing on the 5th at 141°, and on the 6th at 96.5° Fahrenheit, showing a wide range of temperature, from which, however, few, if any, judicious patients suffered anything. Whatever many sleep with open window with benefit, or at least with impunity.

The force of the wind is almost invariably very slight; its average during one of the least calm months amount
ed merely to what is indicated (or Detective Zambra's weather charts) by the figures 2-125. This sometimes

1 Page 14 on Pathology of Davos.
all but imperceptible breeze enables patients at times to sit out for hours together, basking in the sun in mid-winter, surrounded by several feet of unmelting snow, their heads covered by shawls, or shielded by sunshades & their feet protected by thick boots, corkssoles and perhaps two pairs of wool hose.

The most favourable direction of wind is the North, and that most favourably is the West or South-West wind: during the prevalence of the latter a general change sets in, the atmosphere becomes clearer, fresher to many, is undesirable if not impossible, Colersbus are contracted of care & care not better, and a condition of Inervation, relaxation & lassitude is induced, the atomic, sensitive patients suffering most severely.

From November to March or April the ground is thickly covered by snow, which generally falls continuously or nearly so, during two whole days in each week, it is usually so dry and crisp as to be readily shaken off one's outer garments, leaving them quite free from damp.

The snow increases the solar radiation, what is of great consequence to many patients, renders dusty roads with their irritating particles, clean.

The nature and small quantity of fuel burnt, results in an almost-total absence of dust.

The air, it must be stated, is of a very pure or aseptic character, as has been demonstrated by experiment. Dr. Clifford Allbutt, quoting from Mr. Ballard's pamphlet on the Insanity of Davos, says "the higher we carry our last-infusions the steadier they are, and all our..."
Elevation of 5,000 feet they positively may remain unchanged for weeks, unless purposely infected. At Davos, meat—when cleaned up, does not spoil, but is thus dressed and kept for use, and till infected remains stable for long periods."

The diet of the hotels, sufficient in quantity, might as regards quality and cooking, certainly be improved. There is (or was) a supply of excellent spring-water. The drainage during my sojourn in Bally, was fairly good in the hotels frequented by the English. The warming apparatus, consisting of sheets, placed above the coil, was excellent. Especially to be noted the almost total absence of those depressing weights—amounts so common in most aspots for Consecrations.

One of the earliest Climatic effects observed is an improvement in the Appetite, which sometimes becomes pronounced, and generally continues so for some months, of not during the entire period of residence. Light meals, especially those of the district which contain lactic acid, are recommended by the resident practitioners, care being taken that they assist digestion, and help to maintain animal heat in those who are subject to defective circulation, or complain of the Cold, on account of excessive or advanced disease of the lungs.

With increased Appetite there is in the majority—about 75 per cent. according to Dr. Williams— a gain in weight. In some cases (estimated at 5 per cent.) this gain does not occur. Whilst, in a third class of cases (about 25 per cent. according to the same authority), there is a tendency to lose weight.
incision in weight: the last named class generally
does little or no good. Concurrently with the in-
crease in weight: an improvement in the local
condition for the most part took place, as was
seen in Dr. Williams's case DCL (Dr. Williams)
who for
some time gained about 5 lbs weekly after his hair-
combing tendency was sufficiently subdued to allow
of his taking exercise freely; and in the case of W. R., a
young man in the first stage of phthisis who gained
10 lbs each week from end of Nov to beginning of Jan,
subsequently, whilst taking more exercise, increased
3 lbs weekly: and made an excellent recovery; this
patient now enjoys almost robust health.

A patient at Dras may, however, make a decided
fain in weight and his pulmonary mischief mean
while advances as was the case with a M. Y._
who afterwards died in New Zealand; such cases are
exceptional.

Those who declut faint without loss in weight: may greatly
improve both generally & locally (as Dr. E. a patient
in the first stage of Catarhal phthisis (hereditary) of
these cases notes are given at page 26.): he gained 20-
ling until his return to England, but was completely
sustained in health, thus remained well.

One Chronic Case Mr. H. aged 39 (to be again alluded
to under "Pyrexia", page 24.) lost 4 lbs during 11 weeks
of the best of the season (1873-74) and did no good.

It will thus be seen that in the climate of Dras we
have a most potent source to the digestive organs, vital
assimilation, upon so defective in the phthisical, typi-
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As essential to recovery, is greatly promoted by tissue-change also in much accelerated, so that exudation is more readily absorbed, and effete products get rid of: indeed, the whole system appears to be forced; functional activity markedly increased.

In the treatment of the Cough of the Consumptive, the late Professor Burnett advised good feeding, attention to the digestive functions as most valuable: this principle of treatment is well exemplified by the influence of the Swiss Climate: (see also under Cough & Expectoration on page 21.) It must here be stated that there is a small percentage of cases in which this climate induces a painful form of dyspepsia, properly attributed, I think, to the low temperature which prevails during the winter months: in one such case I found a low form of dyspepsia to have supervened, which confined the patient to one room for several weeks, but which, along with its apparent cause, disappeared on appropriate medicinal treatment, and removal to the shores of the lakes of Geneva: such cases are recorded in an Alpine country, although a short residence during autumn may be beneficial.

The effect of the Climate upon the Skin is in many cases remarkable: the hands and face become darker, shrunken and wrinkled, imparting a decidedly less delicate and less juvenile aspect to the individual. In none the fingers, nails and adjacent skin become more or less cracked: these conditions fortunately disappear on return to the plains.

The loss of the insensible fluids is improved, so that debilitating night-sweats are usually speedily relieved.
The pulse at first beats unusually rapidly, the process of a good few beats by a native adult being, I am informed, extremely rare.

The influence of high altitudes on the circulation has been much discussed, but unfortunately the condition of the central organ of the circulation appears, as a rule, not to have been noted. Dr. Theodore Billroth, who has given careful attention to the subject, is of opinion that in the case of strangers, especially those suffering from Conversion, there is at first (during a period extending over several weeks) a slight quickening of the normal pulse rate, which subsequently becomes slow and accompanied by more powerful cardiac impulses and a fuller vascular rhythm.* I think it may be assumed that this subsequent slowing is, in some measure at least, in a number of cases, due to the absence of pyrexia.

In one case which came under my own observation — that of an elderly gentleman (P.W.C.), a very chronic case with a cavity in one lung — the pulse fell from 96 to 80 in the course of a few weeks, and there was concurrently a reduction of temperature, which in a corresponding period fell to normal. Marked diminution in the pulse-rate is, after several months' residence in Davos, the general rule. Dr. Kussotzki found it increased in 18 per cent, but he does not say whether, in these particular cases, fever existed or persisted, nor whether these persons suffered from organic heart disease, which, at such an elevation, would alone probably be a sufficient explanation.

The atmosphere of Paris has a decided influence on the
respiration, Cough and Expectoration.

The first physical impression of which I was sensible
after my arrival at Paris, was the necessity for increased
frequency of respiration; indeed, not only was involuntary
respiration quickened, but a need was felt to supplement
this by occasional deep voluntary inspirations. Owing
to the care taken, new arrivals experience for a Chest
time some difficulty in taking their customary
amount of exercise; the number of inspirations is
generally at first increased by 40 or 50 per minute;
after some months residence, the number is again re-
duced, this reduction being compensated for by an
increase in their depth, the supplementary inspiratory
efforts, meantime, becoming fewer, eventually disap-
fearing altogether.

Of all mental patients in various stages who had re-
sided 6 to 12 months at Paris, Dr. Rendell found the num-
ber of inspirations decreased in 80 per cent; increased
in 5 per cent; and considered (numerically) in 15 per cent.
This diminution in frequency, he finds to coincide
with expansion of the lungs & dilatation of the Chest-Wall,
which conditions permit of a return to the normal
rate of respiration. Dr. Rendell's observations, having
been made on persons suffering from consumption, it
would be interesting to know what proportion of the
several percentages quoted above, suffered from Phthisis
on their arrival, how far the diminished frequency in
respiration was due to decline of the feverish state; how far
it may have been due to a clearing up of the lungy tissue.
having afforded greater breathing space; and whether the relief of anaemia was not an important factor.

Dr. Ruedi found the thorax expanded in 90 per cent. of his cases, that this expansion occasionally took place in those confined to bed, and where there occurred a loss of weight. His observations are confirmed by those of Dr. Theodore Williams, who finds that it is sometimes the affected side, sometimes the opposite, which suffers enlargement; that the greatest dilatation generally takes place at the level of the third rib in front; that the portion of the chest-wall overlying the pulmonary lesion is, as a rule, the least to expand; and that in certain cases of apical disease, remarkable deformities of the chest-result from expansion of the thorax in its lower part; dilatation may or may not be permanent.

Dr. Williams (in the same article) attributes this expansion not to Empyema alone, but also to hypertrophy—a more complete development of certain portions of healthy lung tissue. That change which follows physiological activity induces in an organ—of the lung—lung tissue, and my own experience certainly does go to corroborate his statement, that it is invariable to return to lower levels with greater powers of climbing than were previously enjoyed.

Expectoration is, as a rule, markedly lessened in amount and altered in character, whilst the cough is reduced to a minimum, and helpful cough mixtures required less—seldom necessary. One patient, after about a month's residence found his expectoration reduced by one third more half,
after which, for two or three weeks, no further improvement in this respect took place until he began to climb a height of 600 to 1200 feet each morning. After a week of climbing a further distinct improvement set in and continued. Another patient of middle age, with chronic broncho-pneumonia, found, after a residence of about two weeks, that the expectoration during the whole of three days amounted to not more than he was formerly in the habit of expectorating in a single morning between the hours of 3 and 4, that his cough had become, comparatively, a trifle. This patient also experienced a similar secondary improvement in his chest symptoms after a week or two of systematic climbing; he was soon able to sleep on the affected side, which he had not done for many months. Any observation of these patients leads one to doubt the accuracy of the belief expressed by Dr. H. lecture that climbing had very little to do with the favourable results obtained at high elevations. A third patient (Mrs. C—) in the third stage of phthisis, found that his expectoration after about three months' stay, was very greatly reduced in quantity, and so changed in character as to consist almost entirely of frothy mucus: this poor fellow was shortly afterwards compelled to quit Denver on account of gastric intestinal disorders, & eventually succumbed.

An influence similar to that exerted on the pulmonary, operates beneficially on other mucous membranes also. I can testify to the value of the cliamate in chronic nasal catarrh, & it is said to be of service in atomic vaginal discharge.

As regards Hæmoplegia, I may state that scarce a thing was a novelty in Davos during the winter I spent there, although some of the cases had suffered severely from it prior to their arrival: Dr. F. Kata, Glaugler (of Davos) and Theodore Williams, are all of opinion that a high altitude does not predispose to Hæmoplegia. Dr. Williams says that although his haemorrhagic case (R. T. G., who died as well) "took a great deal of violent exercise, getting under this five months' residence no signs of Hæmoplegia appeared." From this it might be supposed that no ordinary precautions are, or require to be, taken against Hæmorrhage at Davos; On the Contrary, I myself observed that this case R. T. G. was, for a period, extending over several weeks, only allowed a pedestrian range of a few hundred yards, and that on level ground: subsequently I saw him take "regular exercise", not only with impunity, but apparent benefit. I have also observed an instance of a patient who, though very feeble, was ordered to climb, and Hæmoplegia followed. Dr. Williams agrees with Dr. Chesser "that the ascent and descent from Mountain Stations should be managed with great caution for fear of inducing Hæmoplegia," and advises a gradual ascent, where the climbers period arrives."

"The influence of the Davos climate on the Erysipelas of Skelites is one of considerable importance: Dr. Reed says that the fever must exist within six weeks of the patient's arrival at Davos or he is in great danger," *** and Dr. Williams holds the Davos treatment to be contraindicated "in all forms of Skelites, Acute or Chronic, accompanied by Erysipelas." "****

With reference to the former statement—that by Dr. Rouse—there can be little doubt that those in whom the fever does not in the main subsist within six weeks should, without delay, be sent elsewhere. I remember one such case. No. 4—(referred to under “Weight”—page 17.) The walls were fitful, and caught brain fever, and for the first three months had generally been in a fever, which occasionally rose to 103°, or higher, and was followed by excessive night sweats.

The latter statement—that by Dr. Williams—I consider much too exclusive & requiring explanation. The following cases occur to show this: No. 7, with early in one lung, suffered during 1877 and 1878 from an acute exacerbation of his very chronic disease, attended with intermittent fever, which continued until after his arrival in Davos (end of Sept. 1878), when it began rapidly to abate, and was about four weeks had altogether disappeared, except a slight recurrence once in every three or four weeks after which was followed by slight perspiration at the same hour next morning. It may here be remarked that this patient immediately before leaving his home (near to Dartmoor in S. Devon) could not walk more than a mile, with the greatest discomfort, due to dyspepsia & debility, and that after a month’s residence in the Alpche valley he was able to walk four or five miles on the level without the slightest discomfort, and subsequently walked & climbed for four hours a day with great benefit. J— although one winter’s residence was not sufficient to effect a cure in Dr. Rouse’s case, he was able after his return direct home from Davos in March 1879, to resume his customary horse-back exercises.

A young man (Mr. J—) suffering from phthisis in 1878.
Earlier stage, but more acute, arrived in Davos, also in the
end of Sept. 1878: he was delirious, had rapid breathing
and marked hectic flushes. This patient became gradually
less delirious, so that by about the end of November it had disappeared, & to the close of his stay did not return.

The influence of the climate on the Nervous System is
beneficial, and exciting to be suitable to nervous
diseases, and cases of phthisis complicated by Nervosity.
All mountain resorts are said to be contraindicated
when "cerebral irritation" exists. In Davos some sleep
very soundly, whilst others are troubled with sleepless
ness to a degree never experienced by those at lower
levels.

as instances of purely nervous origin, for example, whilst those
cases where the disease supervenes on Bronchitis may be ex-
pected to be benefited.
State of the Chest.

On examining phthisical patients who have been subjected to the Davis treatment, there is generally found a condition corresponding to the expansion already alluded to at page 21. On inspection is seen a general fulness of the chest, with perhaps an apparent flattening over part of the original lesion. Percussion shows hyper-resonance over the healthy side, and it may be over the greater portion of the diseased side, passing into resonance & then some dulness, in the region of the (former) mischief.

Vaccination usually gives deep парилal breathing with feeble inspiration on the unaffected side & over three portions of the affected side distant from the seat of lesion; more or less prolonged inspiration in the immediate neighbourhood of the lesion; and, in cases in which the disease had advanced, any sounds are found substituted for Moist ones. That the hyper-resonance is in a great measure due to a more complete development of certain portions of healthy lung tissue; & not entirely the result of hyperaemia, is evident, not only from its combination with deep long inspiratory sounds and feeble Inspiration, but also from its association with improved breathing & climbing power.

I shall now give some potting from my notes of an illustrative case, which underwent the Davis treatment during the unsatisfactory winter 1878-79.

1st Oct. 1878. Mr. T. aged 24 years: Student.

Symptoms: Facility, Delicate, and weak at first. All died young of "Consumption," as probably also the maternal grandmother.

Aged 17: died of consumption at 15 years; Brother of Consumption and heart disease at 16 years, and a second sister of tubercular phthisis at 31, thus showing a fearful hereditary tendency. (Personal) Patient, aged 27, suffering from general debility during early spring of 1878, contracted a bronchial catarrh, which, accompanied by cough and succeeded by night sweats, has recently subsided.

Examination: Patient-13 A.M. Nature: Complains much of debility for duration, both mental and physical. However, no albumen in urine; no haemorrhages; no Cough now.

Inspection of chest: some infraclavicular flattening on right side. Percussion + Auscultation show left chest to lie in every respect quite normal.

Right chest gives anorexia dulness, slight dulness distinct down to second rib, with prolonged inspiration over the same part. There are no accompaniments; Vocal resonance is increased posteriorly, a bronchial wheeze or two are heard over base.

Diagnosis: Bronchial Phthisis in first stage andBronchitis, the latter passing off. (Hard-Romie) Treatment: Soda hypophosphite p o 1/3 Three daily: Belladonna Excipient for night sweats, Winter's Basso. Reached Basso July - towards end of Sept. 1878.

Examined 12th October: In addition to the condition above mentioned, are found a few occasional moist rales over a limited area (about 1 inch by 1 inch) below right clavicle; also slight dulness + bronchial breathing posteriorly in supra- scapular region on same side. No night sweats - taking considerable ber ease - appetites greatly increased.

Examined 25th November: Percussion now shows anorexia only slight dulness over very small area below outer end of clavicle, and to auricular talent at point of point of pul.

Only
(Examination 23: Not Continued) - Breathing Easement; now he said to be bronchial at any part, nor can any increase of vocal resonance be detected: Appetite Excellent.

Examination 5th January 1849: Condition of chest as the same as on 25th November.

Examination 5th February: Respiration now gives only slightest possible shade of dulness towards end of right clavicle.

Feb 18th: Note: The percentage of moisture in atmosphere, which in September & October was small, rose to an average of 61 for December, 69 for January, and for the 18 days of this month (Feb) to nearly 77.

18th March 1849: Arrived at Voelkauh, having left Davos on account of increasing humidity of atmosphere; finds the air of Voelkauh pleasant, but too resembling to permit of much exercise being taken; left for England 7th April.

Examination in London 12th April 1849: Inspection reveals no flattening: Resonance over whole chest is quite satisfactory.

On auscultation, there is neither harshness nor anything like bronchial breathing, nor is there increase of vocal resonance anywhere: Above second rib on right side a louder expiratory sound occurs to indicate where disease had previously existed: at left apex is slight Brushty sound.

May 30th 1849: Has rested six weeks in country district in Scotland, returning that time gained about 13 lbs in weight; (at Davos he increased in strength but not in weight.)

Patient is now long-winded, cheeks hollow, with distinctly greater ease than formerly: indeed, in climbing, still considerate invariably having him to a stand before the least of breath. The disease has (April 1842) not returned.
Remarks on Mr. G."s case: I would simply direct attention to the following points: 1. The strong hereditary tendency to polyuria. 2. The condition of general debility and anaemia. 3. The marked progress of the case during the earlier part of his residence when the atmosphere was much drier than latterly. If, as the fact that the winter of 1878–79 was, as a whole, notoriously bad at all the European health resorts, or, or, as Albee says, the winter... has been, not only in Dares, but everywhere, one of the worst of not the worst, within the memory of man.

To sum up: the climatic & other influences of Dares, in suitable cases, generally lead to:—
1. Improved digestive functions, increase of appetite, weight, tissue change and ability for exertion—mental & physical.
2. Diuresis of Polyuria, with more powerful cardiac contractions and fuller vascular system.
3. Diuresis & improvement in character, of expectoration, checking of night-sweats, & other abnormal discharges.
4. Reduction in frequency of respiration, with increase in depth of inspiration, resulting in
5. Thoracic expansion, with some improvement in the more complete development of healthy lung tissue.
6. Lesser tendency to anaemia.
7. A reduction in frequency in some cases.
8. Sleep improved in some; remained worse in others.
9. Lungs cleansed by dust- & atmospheric moisture, supplied instead with air of acceptable quality.
Enthusiastic surfaces unchilled by brain-thrash.

10. There is also much in accuracy, habits, and society to

quell the mind from abnormal bodily conditions.

I think it must be conceded that such conditions

and efforts as these became evident will go far to counter-

act hereditary tendencies to phthisis to meet the

other necessities of the case mentioned at the outset

on page 10. It is remarkable that, although, enteritis

and pneumatic inflammations are not the common

among the nations of this region, yet these, it is said,

are never found to pass into a degenerative phthisical

stage, and yet more remarkable that in Durko (see p. 12,

nearby 10,000 feet) spontaneous phthisis is according

to Dr. Dumez, of Rillo University, who for years

practiced there, practically unknown, although.

Cerebral and inflammatory affections of the bronchial

tubes and pulmonary pulmonary parenchymas are frequent

seen, and various forms of typhoid disease are so

common as to impress a peculiar character on surgery.

So what climatic conditions are these results at-

tributable? Doubtless the marked expansion of the

thorax observed in some cases, must be attributed to

the carelessness, assisted by climbing, for this is a

result not attainable on sea-level in localities in

localities where the other quantities of mountain

air are present—so far as is known, at least; the

improved appetite and condition of the digestive organs

of greater ability for laborious, chiefly to the lower Effect of

the cold square air, the cheeks up of Inspiration & their discharges chiefly to the acute quality tinges of the air; whilst the strengthened cardiac impulses & general well-being, must be attributed to the stimulating character of the air; to the increase of illumination, to the increased strength resulting from improved assimilation &c. &c.

Under Causation, I have (at page 7) alluded to the view of Dr. Brehmer, that the conditions of the well-behaved heart-difficulties greatly favours the development of phthisis. Dr. Brehmer, who is one of the originators of this Mountain Air Cure, bases the treatment entirely on the fact of the heart-in cases of this disease being small, and the stimulating influence of the Mountains tending to its further development, and thus to improved circulation.

There are many cases of early phthisis with a constitution which or have a cavity in one lung, which will do well enough in their Country with care, provided there be no chronic hereditary predisposition; in some cases, such as those of the soda-burned clerks, typewriter and machine girls, et seq., perhaps sufficient to remove these from their unhealthy occupations and give them fresh Country air, with plenty of food, food & early hours. But in considering the success attending the treatment of cases at Davos el-erustic, one must be borne in mind that those and there are almost absolute cases such as have already been possessed of these and knew more advantages prior to undergoing elevation treatment, than found there.
of little or no avail; or when relatives, having a similar
predisposition, have made use of the best means
available in the United Kingdom, & experienced
their value in prolonging life, feel inclination to adopt
that—which is practically a cure.

As to the cases which are available for the Davos Treatment:
1. As a Preventive: most suspicious Children, and those
who are the Offspring of malignant parents, may be
sent there for one or two Reasons from Beginning of
September to Midst of March.
2. When the disease has actually set in, the earlier
patients are sent the better for obvious Reasons.

The Classes of Cases most likely to be cured or greatly
benefited are:

a. Haemorrhagic Poliomyelitis, especially those in which
the pulmonary lesion is small as compared with
the amount of haemoptysis: the complications
an old pleurisy is no Contraindication.

Illustrative of this Class may be mentioned:
Dr. Theo. Wolters’s Case No. 1, R. S. G. aged 20, described in
Lancet for 1879, Vol. 2, p. 192. This Case Dr. Wolters has
classed as non-incurable, which is strictly correct, but
I ascertained that his father, when young, had suffered
long from an affection, which, from his description, I
could only interpret as bone disease.

Also Dr. Allbutt’s Cases No. 48, aged 32 years, and
62 aged 19 years, also found
and Cases No. 55, aged 24 years, and
66 aged 20 years, in same
volume at pages 118 and 119 respectively.
L. Consolidation at one apex in patients in whom it is either accidentally acquired or hereditary. For example: Mr. T. aged 27 years (see p. 26.)

Dr. Williams' Case No. 11, 30 years of age, given in Transactions of Internal Med. Soc. 1852, vol. 1, p. 164.

Dr. Albutt's Case No. 85 aged 23 years. Lancet 1859, vol. 1, p. 119.

From I will remember on his arrival at Paris in November 1878, not having a very promising appearance.

E. Catarhal Pneumonia, with cavity not progressive for example: Dr. Williams' Case No. 2 aged 22 years given in Lancet for 1879, vol. 2, p. 182.

Also Mr. E. mentioned in these pages (24.)

I have already under "Pneumia" page 23, expressed the opinion that Dr. Williams is incorrect in 82 - including "all forms of pleurism acute or chronic accompanied by pyrexia" and quoted cases in support thereof. The following cases quoted by Dr. C. Albutt go to prove the same:


Case No. 33, aged 19 yrs. Lancet 1879, vol. 2, p. 79, both lungs diseased large cavity in one, in whose the temperature in one month was reduced from 102° to 99° 5°, & in whose one lung recovered perfectly.

Cases No. 46, aged 50 yrs. Lancet 1879, vol. 2, p. 78 - a case of pleuritis with Bronchic asthma in which the fever quickly disappeared.

Case No. 66, aged 25 yrs. Lancet 1879, vol. 2, p. 118 - one of bilateral pleuris with cavity in which fever disappeared
in three weeks; ICEDERD these cases too numerous to mention here. Dr. Allbutt says "one of the first changes for the better seems to be in the disappearance of the fever. Almost invariably the fever ceases in from three to ten days (the septic poison is absorbed and no longer generated) and while present is far more amenable to appropriate treatment . . . . . If the fever returns during the stay at Davos, Dr. Eugen and Bede advise the patient's removal, but its recurrence seems to be rare".

Dr. Williams further says, "It seems to me that the same influence which so powerfully stimulates the discharge . . . . increases a corresponding influence on the inflammatory process and corrects what in England would be passive congestion with low temperature, into a well-marked progressive inflammation: such is the healing influence of mountain air."*ni

A possible explanation of the difference in views as to the suitability of mountain air to pyrexial cases is that Dr. Williams probably alludes to pyrexias arising from phthisis in an acute progressive stage, whilst there can be but little doubt that Dr. Allbutt has chiefly in mind those cases in which the fever is due to septic poisoning through absorption from Carriero's with putrefying contents.

Cases unsuitable for Davos treatment.

Although no very definite limits can be drawn, the cases unsuitable for Davos treatment are . . . . generally speaking of


the following:
a. Those in whom a large area of lung tissue is involved; and suffer from imperfect aeration of blood due to the absorption of the air, complain more of shortness of breath than at sea-level, and also of the cold, as for example, Dr. Williams's case No. 3, aged 18 yrs. Lancet 1879. Vol. 2 p. 233. with fibrosis of whole lung and a cavity.
b. Cases in which the disease is advanced, with inevitable dyspnoeic state, diarrhoea and rapid emaciation.
c. Lung-seal Phthisis.
d. Cases complicated with organic heart-disease, with hepatic and Bright's disease, and with primary Pne-
monea.
e. Those advanced in life, or prematurely aged, and all cases with markedly palatal circulation, cannot endure the cold, and should only be sent to Davos in autumn, or perhaps to a warmer direction, as Zürich or the South African Uplands: as for example, Dr. Williams's case No. 6 (Mrs. X.) aged 26 years: Lancet 1879. Vol. 2. p. 233.
f. Patients in whom actual breaking up of lung tissue is proceeding should delay their arrival in Davos. Finally: if there be doubt as to the curability of par-
ticular cases for Davos, they may be sent early in September, so that experience of the climate may de-
termine whether they be allowed to remain beyond the middle of November, for possibly a couple of months' do-journey would be beneficial to them, generally & locally, and to former of a country's residence; and if not, the lake of Gavares can be easily reached.
Of some importance is the question whether the high altitude treatment ought to be supplemented by medicinal treatment. I am decidedly of opinion that in many cases it should. Such however is not the practice followed by the Daroo Physicians. Dr. Allbutt very correctly states that "they seem to say to their patients, 'It is the air which is to be your cure...you need little or no medicine...beware of sudden changes of temperature."" *

Mr. Lynden (the Author of an article on Daroo in the Fortnightly Review) says, "personally I have met with a great reluctance on the part of my physicians to allowing me any indulgence in the way of tonics or sedatives," and from my own observation during the winter I spent in Daroo I am compelled to admit that there is little evidence of the following statement made by Dr. Howard, viz., that "little reliance is placed on medicines which are seldom administered by the foreign Medical Men practising there, even in cases which would appear to us to urgently call for them."

There is in Daroo air nothing to contraindicate the administration of Cod liver oil to the Scrophulose. Indeed, in such a climate although less needed than elsewhere, it is more likely to be easily taken, duly assimilated and productive of much benefit; nor do I see why the tonic-altitude treatment should not be aided, in the more delicate, by the administration of such drugs as fellow's Syr. Hypophos. +

the Hypophosphites of Lime & Soda, and in Accoucheir Cases by Bland's pills of Iron & Potash. Especially would such a practice be of great utility in the case of patients seen during early Antenaeae, with the suppression of pain and during the earlier part of their stay, sufficient to enable them to continue through the Winter months.

Fortunately, for Cough & Stomach Disturbances there is seldom any need: Dyspepsia & diarrhoea, however, when they do occur, require suitable medicinal treatment—as elsewhere, and cannot—be neglected with impunity. As in the early abortion—of cases in physical cases, Dicouine might be judiciously given: to this I found one of the Resinetric physicians opposed, the reason alleged being, that those cases which came under his care after having been treated by the drug proceeded less favourably than others.

Just as in the origin of Phthisis there is frequently one main cause, aided in its operation by others less powerful; so, in the treatment—of the disease, it is rational to endeavour to increase the therapeutic potency of a particular agent—by all useful adjuvants—

Several criticisms have been written on the Davis treatment of Phthisis, notably those by Dr. H. Bassall & Dr. J. Henry Buncel. From Dr. Bassall's opening lines, it is apparent that he visited the Ingadine and Davos under circumstances the most likely to produce an unfavourable impression; that he did not correctly inform himself on some points; and indeed his whole article

article appears written in a prejudiced spirit. His paper has been so ably replied to by Dr. Symonds* and Dr. Reed. That little room is left for further criticism: I may just remark that Dr. Hassall is quite mistaken as to Davos being cut off from the rest of the world during winter: also in his opinion, that residence there is unfitted for more temperate climates; and as to a “cure for the duration of fever,” I can only say that I never, during my prolonged stay in Davos, heard of such a practice.

The criticism by Dr. Henry Benuel** is the more able and valuable, and by its means he would, I venture to think, convince almost anyone without special knowledge and experience of Davos, of its inferiority, for consumptionists to the Riviera: Dr. Benuel, however, shows that he has been misinformed when he speaks of “from 19 to 21 hours (out of the 24) being spent in stone heated, heated, poisoned rooms,” for besides the fact that a greater number of hours are generally available than he supposes, for outdoor exercise, it is a common custom, not only to sit during the day, but also to sleep during the night, with open windows. Dr. Carlile M.D. states that he had spent winters in various health resorts—the South of France included—but that “Davos is the only place where he has been able to sleep throughout the winter with open windows without feeling cold.”

In conclusion, on account of the totally different character of the meteorological conditions, all included...
from anything met with at low levels, it is not to be
wondered that many should find it "difficult to
comprehend how such extreme variations of tempera-
ture can be otherwise than injurious in the great
majority of detected cases of phthisis". I have al-
ready said that I never knew a judicious patient
suffer from these variations.

I, George Daniel Smith, do certify that the
foregoing thesis has been composed by myself.
George Daniel Smith
M.B. & Ch.B. Univ. Edin. 1879.

59, Perry Road,
Leith, 26th April 1882.