WORK-IN-PROGRESS (DECEMBER 31, 2023) PARALLEL CHART FOR

Chapter 51 — Humidity and Health

of *The Essentials of Healthful Living* (1925)
by William S. Sadler, M.D., F.A.C.S.

Sources for Chapter 51, in the order in which they appear

(1) Milton J. Rosenau, *Preventive Medicine and Hygiene* (New York: D. Appleton and Company, 1917)

(2) D. H. Bergey, A.M., M.D., Dr. P.H., *The Principles of Hygiene: A Practical Manual for Students, Physicians, and Health-Officers* (Philadelphia: W. B. Saunders, 1921)

(3) W. A. Evans, M.S., M.D., LL.D, D.P.H., *Dr. Evans' How to Keep Well: A Health Book for the Home* (New York: D. Appleton and Co., 1917)

(4) Charles Harrington, M.D., *A Manual of Practical Hygiene for Students, Physicians, and Health Officers; Fourth Edition, Revised and Enlarged* by Mark Wyman Richardson, M.D. (Philadelphia: Lea & Febiger, 1914)

Key

(a) Green indicates a Sadler text (book or magazine article).

(b) Yellow highlights most parallels.

(c) Tan highlights parallelisms not occurring on the same row.

(d) An underlined word or words indicates where the two parallel texts pointedly differ from each other.

(e) **Bold type indicates passages which Sadler copied verbatim, or nearly verbatim, from an uncited source.**

IV, II: PRESSURE, TEMPERATURE, AND HUMIDITY (Rosenau 681)

HUMIDITY (Rosenau 689)

[contd] **Aqueous Vapor.**—**Water in its gaseous state is always present in the atmosphere.**

Water vapor is **the most variable of the normal constituents of air,**

and also one of the most important, on account of its influence upon health (R 689).

As water vapor weighs only about three-fifths as much as air, dry air is heavier than moist air under equal conditions of temperature, pressure, etc.

It is customary to speak of air "holding" water vapor.

As a matter of fact, the air has nothing to do with it, for it should always be clearly observed that

the presence of water vapor in any given space is independent of the presence or absence of air in the same space.

The amount of aqueous vapor which a space contains depends entirely upon the temperature and not upon the presence of the pressure of the air.

LI: HUMIDITY AND HEALTH

51:0.1 **Water in its gaseous state is always present in the atmosphere,**

being one of **the most variable of the normal constituents of air,**

and also one of the most important, on account of its influence upon health.

As water vapor weighs only about three-fifths as much as air, dry air is heavier than moist air under equal conditions of temperature and pressure.

51:0.2 **It is customary to speak of air "holding" water vapor.**

As a matter of fact, the air has nothing to do with it, for it should always be clearly observed that

the presence of water vapor in any given space is quite independent of the presence or absence of air in the same space.

The amount of water vapor which a given space contains depends entirely upon the temperature and not upon the presence or pressure of the air.

At 32° F., for instance, the air can "hold" 1/160 of its weight of water vapor, at 59° F. 1/80 of its weight, at 86° F. 1/40 of its weight.

Roughly, every 27° F. increase of temperature doubles the amount of water vapor the air can hold in proportion to its weight.

In this way the heat of the atmosphere is self-protective, for it loads the air with water vapor, which in turn absorbs much of the heat.

The latent heat is again given off on condensation.

The actual amount of water vapor which the air can hold at different temperatures is shown in the following table:

[contd] A cubit foot of air can hold at

[TABLE] (R 689)

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The actual amount of water vapor which the air can hold at different temperatures is shown in the following table:

51:0.3 A cubic foot of air can hold at

[TABLE]

ABSOLUTE AND RELATIVE HUMIDITY

I: AIR (Bergey 32)

Absolute Humidity. This is the weight of water in the form of vapor contained in a given volume of air expressed in grams per cubic meter.

It varies with the temperature, and it may be computed from the readings of the wet and dry-bulb thermometers by the use of tables (B 41).

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It varies with the temperature, and it may be computed from the readings of the wet and dry bulb thermometers.

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It varies with the temperature, and it may be computed from the readings of the wet and dry bulb thermometers.

[contd] **Relative Humidity.—Complete saturation of the air being taken as 100, any degree of dryness may be expressed in percentage.**

The amount of aqueous vapor actually present, and the amount that would be present if the air were saturated, being known,

the former is expressed as a percentage of the latter, giving the relative humidity.

Relative humidity is greatest near the surface of the earth during night, when the temperature, being at or near the daily minimum, reaches the dew-point;

it is also great in the morning, when the sun's rays have evaporated the dew, and the vapor is as yet diffused only a little way upward;

and it is least during the greatest heat of the day (B 41).

[contd] **The Influence of Humidity on Health.— ... The temperature of the body is regulated by the loss of heat by evaporation from the lungs and skin** (B 41).

If the relative humidity be increased, there will be a hindrance to the escape of water from the body;

and when this condition is combined with a high temperature the heat is far more oppressive than when the atmosphere is dry and allows free evaporation.

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51:1.3 **The temperature of the body is regulated by the loss of heat by evaporation from the lungs and skin.**

If the relative humidity be increased, there will be a hindrance to the escape of water from the body;

and when this condition is combined with high temperature the heat is far more oppressive than when the atmosphere is dry and allows free evaporation.

SOURCE	51: ESSENTIALS OF HEALTHFUL LIVING
On the other hand, a moist, cold atmosphere is far more distressing than when the air is dry and there is but little movement (B 42).	On the other hand, a moist, cold atmosphere is far more distressing than when the air is dry and there is but little movement.
IV, II: PRESSURE, TEMPERATURE, AND HUMIDITY (Rosenau 681)	
HUMIDITY (Rosenau 689)	
Clouds do not necessarily imply high relative or absolute humidity of the lower atmosphere.	51:1.4 Clouds do not necessarily imply high relative or absolute humidity of the lower atmosphere.
Rainfall also gives only a very general indication of the humidity of the atmosphere.	Rainfall also gives only a very general indication of the humidity of the atmosphere.
A place with high rainfall may have low absolute and relative humidity, and *vice versa;*	A place with high rainfall may have low absolute and relative humidity, and vice versa;
that is, a rainy district is not necessarily a damp district, so far as the atmosphere is concerned (R 693).	that is, a rainy district is not necessarily a damp district, so far as the atmosphere is concerned.
When the relative humidity reaches 80 to 85 per cent., moisture condenses and begins to show upon objects in rooms.	51:1.5 When the relative humidity reaches 80 to 85 per cent, moisture condenses and begins to show upon objects in rooms.
This influences natural ventilation through porous building materials (R 693).	This influences natural ventilation through porous building materials.
Cold walls, cold windows, and cold surfaces generally condense the moisture from the air so rapidly	Cold walls, cold windows, and cold surfaces generally condense the moisture from the air so rapidly
that great difficulty is experienced in raising the relative humidity of the air of a room under these circumstances (R 693).	that great difficulty is experienced in raising the relative humidity of the air of a room under these circumstances.

SOURCE

Methods of Determining Heredity in the Air.— ... PSYCHROMETERS.—The most convenient of all methods for measuring atmospheric moisture is to observe the temperature of evaporation,

that is, the difference between the temperatures indicated by wet and dry bulb thermometers (R 694).

Aqueous Vapor.— ... In England the relative humidity averages 75 per cent.

In California it drops from 100 per cent. at dawn to 22 per cent. at noon.

A hot wind, by increasing the capacity of the air for moisture, may also lower the relative humidity very quickly (R 691-92).

The mean relative humidity of Denver for the year is only 42 per cent., at San Diego, on the coast, 72.9, at Los Angeles, a few miles inland, 66.6.

In the heart of the Libyan desert the relative humidity may be as low as 9 per cent.

At the seaside daily variations in humidity are less than inland (Macfie) (R 899).

There may be a very great difference in the relative humidity of outside cool air and of air in a closed heated room, in that the latter may be very much drier (R 899).

51: ESSENTIALS OF HEALTHFUL LIVING

51:1.6 The most convenient of all methods for measuring atmospheric moisture is to observe the temperature of evaporation,

that is, the difference between the temperatures indicated by wet and dry bulb thermometers.

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In the heart of the Libyan desert the relative humidity may be as low as 9 per cent.

At the seaside daily variations in humidity are less than inland.

There may be a very great difference in the relative humidity of outside cool air and of air in a closed heated room, in that the latter may be very much dryer.

SOURCE

Relation of Humidity and Temperature to Health.—The physiological significance of moisture in the air

varies with many factors, but especially with temperature.

In a general way it may be said that moist air is depressing and enervating, while dry air is tonic and stimulating;

also that cold air is tonic,

while warm air is depressing (R 904).

The human body can adapt itself to wide variations in heat and humidity, and by means of suitable clothing and food the range may be greatly increased.

Certain combinations of heat and humidity are trying or even hurtful;

the most mischievous combinations are cold damp air and warm moist air,

also an excessively dry air, especially when artificially warmed.

Many climates in which people are reasonably healthy have a relatively high humidity,

and some regions famed for their salubrity are notoriously dry and arid.

The frequently changing temperatures and variable amounts of water vapor of most climates

HEALTH AND HUMIDITY[1]

51:2.1 The health influence of moisture in the air

varies with many factors, but especially with temperature.

In a general way it may be said that moist air is depressing and enervating, while dry air is tonic and stimulating;

also that cold air exerts a tonic influence

while warm air is more or less depressing.

"The human body can adapt itself to wide variations in heat and humidity, and by means of suitable clothing and food the range may be greatly increased";[2]

but various combinations of heat and humidity may be deleterious to health and comfort—

such as cold damp air, warm moist air,

and excessively dry air.

Many healthful climates have a relatively high humidity,

while some regions famed as health resorts are notoriously dry and arid.

On the whole,

frequently changing temperatures and the variable humidity of most climates

SOURCE	51: ESSENTIALS OF HEALTHFUL LIVING
may be beneficial in stimulating the heat-regulating mechanism (R 697).	are beneficial in that they stimulate the heat-regulating and nervous mechanisms of the body.
More heat is produced within the body than is required,	51:2.2 More heat is ordinarily produced within the body than is required,
hence heat must be lost, else heat stagnation or heat stroke will result.	hence heat must be eliminated, otherwise it would accumulate and result in heat stroke.
The temperature of the air, but still more its humidity, influences heat loss (R 697).	The temperature of the air, but still more its humidity, exerts a marked influence on the loss of heat.
The chief source of the body heat comes from the food we eat.	51:2.3 The chief source of the body heat is the food which we eat.
Approximately 80 per cent. of the food we eat is used to furnish heat to maintain the body temperature,	Approximately 80 per cent of the food we consume is used to furnish heat for the maintenance of the body temperature,
while only about 20 per cent. furnishes energy in the form of motion.	while only about 20 per cent yields energy in the form of motion.
Heat is lost from the body chiefly in two ways:	**Heat is lost from the body chiefly in two ways:**
(1) *by heat transfer,* or loss by radiation, conduction, and convection;	(1) by heat transfer (radiation, conduction and convection);
controlled almost entirely by changes in the dilatation and contraction of the blood vessels of the skin;	
(2) by *evaporation,* chiefly by the evaporation of the water of perspiration;	**(2) by evaporation, chiefly by the evaporation of the water of perspiration.**
controlled by the varying activity of the sweat glands (R 697).	
The loss by heat transfer diminishes as the temperature of the surrounding air rises.	**The loss by heat transfer diminishes as the temperature of the surrounding air rises.**

SOURCE	51: ESSENTIALS OF HEALTHFUL LIVING
The temperature of the body would rise when the atmospheric temperature goes above 70° F.	The temperature of the body would rise when the atmospheric temperature went above 70° F.
were not perspiration then secreted.	were it not for the fact of free perspiration.
So long as the perspiration can evaporate freely the heat production and heat loss are balanced.	So long as the perspiration can evaporate freely the heat production and heat loss of the body are quite evenly balanced.
With a high humidity evaporation is lessened	With a high humidity, evaporation is considerably lessened
and the balance is maintained by rushing blood to the skin,	and the best eliminating balance is maintained by rushing increased quantities of blood to the skin,
which causes an elevation of the temperature of the surface,	which in turn causes an elevation of the temperature of the surface of the body,
and thus the loss of heat by radiation, conduction, and convection is facilitated (R 697-98).	which not only increases heat loss by radiation, conduction and convection,
	but further dissipates heat by facilitating the evaporation of increased amounts of perspiration.
There is a neutral zone, around 68° F., at which humidity has comparatively little effect.	51:2.4 **There is a neutral zone, around 68° F., at which humidity has comparatively little effect**
	on the heat regulating mechanism of the body.
Hence, if the temperature of a room is kept just right and the occupants are sitting still, it makes little difference whether the air is humid or dry.	**Hence, if the temperature of a room is kept just about right and the occupants are sitting still, it makes little difference whether the air is humid or dry;**
However, a difference of a few degrees above or below this temperature	but the fluctuation of a few degrees above or below this neutral temperature
will have a marked influence (R 698).	will produce definite reactions on the part of the body.

IMPORTANCE OF THE WET-BULB TEMPERATURE.—**The individual susceptibility to temperatures depends entirely on the temperature recorded by the wet-bulb thermometer,**

no matter what the dry bulb registers.

Hill, Rubner, Pembrey, Boycott, Cadman, Nagel,

and practically all authorities agree with Haldane that the air of workrooms should not exceed 70° F. by the wet-bulb thermometer (R 698-99).

[contd] **Rubner states that an untrained man can be in comfort in a temperature of 75° F. and 80 per cent. humidity (wet bulb about 70° F.) only when he is quiet.**

At 73.4° F. and 60 per cent. humidity he found a resting man lost by evaporation 75 grams of water per hour, and at 84 per cent. humidity (wet bulb 70° F.) only 19 grams (R 699).

A man is much less efficient in a warm moist atmosphere;

hence it is an advantage to both employer and employee that work be performed at temperatures below 70° F. by the wet bulb.

At the lower temperatures work is done faster, more efficiently, and with less fatigue, discomfort, and injury to health (R 699).

WET BULB TEMPERATURE

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At the lower temperatures work is done faster, more efficiently, and with less fatigue, discomfort and injury to health.

SOURCE

Effects of Warm Moist Air.— ...
When air above 88° F. becomes saturated evaporation can no longer compensate for decrease in radiation,

and the body temperature accordingly rises and heat-stroke may ensue.

The injurious effects of the summer heat are practically always the result of combined heat and humidity (R 700).

A poorly ventilated room in which the air becomes vitiated is usually a warm moist atmosphere,

and the ill effects of a vitiated atmosphere are mainly caused by the heat and moisture (R 700).

Effects of Cold Damp Air.—When such air is injurious

the victim is usually underclad, improperly fed, or has been living an indoor life.

In certain cases cold damp must always be injurious,

as, for instance, where the vital forces are at a low ebb

and where there is restricted capacity for making heat, such as infancy or old age;

in cases of kidney disease, where hindrance of evaporation and increased metabolism means extra work for the kidneys;

51: ESSENTIALS OF HEALTHFUL LIVING

51:3.4 **When air above 88° F. becomes saturated evaporation can no longer compensate for decrease in radiation,**

and the body temperature accordingly rises and heat-stroke may ensue.

The injurious effects of the summer heat are practically always the result of combined heat and humidity.

51:3.5 **A poorly ventilated room in which the air becomes vitiated is usually a warm moist atmosphere,**

and the ill effects of a vitiated atmosphere are mainly caused by the heat plus the moisture.

COLD DAMP AIR[3]

51:4.1 When cold damp air is injurious

the victim is usually underclad, improperly fed, or has been living an indoor life.

In certain cases cold damp air must always be injurious,

as, for instance, where the vital forces are at a low ebb

and where there is lessened ability to make heat, such as in infancy and old age;

in cases of kidney disease, where decreased evaporation of sweat means extra work for the kidneys;

also in cases where there is a tendency to rheumatism or disorders of metabolism.

also in cases where there is a tendency to muscular rheumatism or other disorders of metabolism.

The effects of cold damp air may be neutralized by proper clothing, by muscular activity,

The effects of cold damp air may be neutralized by proper clothing, by muscular activity,

and, to a limited extent, by diet (R 700).

and, to a limited extent, by regulation of the diet.

[contd] Just how cold damp air influences health is not well understood.

51:4.2 In just what way cold damp air influences health unfavorably is not very well understood.

It throws an added load upon the heat-producing mechanism to maintain the body temperature;

Of course it throws extra work upon the heat-producing mechanism in its effort to maintain the body temperature;

the strain falls especially upon digestion, and metabolism, and also upon the circulation and the kidneys,

all of which involves digestion, metabolism, the circulation and the kidneys,

and indirectly upon the nervous system.

and indirectly the nervous system.

Macfie suggests that:

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"Dry air quickens metabolism both through its cooling and drying capacity, while damp air slows it by diminishing loss of water.

"Dry air quickens metabolism both through its cooling and drying capacity, while damp air slows it by diminishing loss of water.

It is possible that much of the harm attributed to damp and to cold is due to a depression of metabolism and accumulation of harmful waste products in the body" (R 700-01).

It is possible that much of the harm attributed to damp and to cold is due to a depression of metabolism and accumulation of harmful waste products in the body."

A healthy man may daily move in and breathe cold damp air without suffering in health to any appreciable extent;

51:4.3 A healthy man may daily move in and breathe cold damp air without suffering in health to any appreciable extent;

however, it is generally believed that a cold damp air predisposes to affections of the respiratory passages, to rheumatism, and neuralgias (R 701).

however, it is generally believed that a cold damp air predisposes to affections of the respiratory passages, to neuritis, neuralgia, etc.

FROSTED WINDOWS

LVI: VENTILATION—HEATING—HUMIDITY (Evans 1144)

HUMIDITY (Evans 1193)

FROSTED WINDOWS (Evans 1193)

[contd] As you go along the street in winter

51:5.1 As you walk along the street during the winter

you will notice that some of the windows are clear and others covered with frost.

you will observe that some of the windows are clear while others are covered with frost.

Some of those which are clear are so because of fans which blow the warm air of the room against them,

Some of those which are clear are so because of fans which blow the warm air of the room against them,

others because of large radiators beneath them,

others because of large radiators beneath them,

others because of double windows with a clear space between them,

others are clear because of double windows with an air space between them,

and still others are free from frost because the air in the rooms is so dry that it has no moisture to deposit (E 1193).

and still others are free from frost because the air in the rooms is so dry that it has no moisture to deposit.

[contd] *Nothing is more frequent than to have janitors object to humidifying the air of the rooms*

51:5.2 Janitors commonly object to humidifying the air of the room

because it makes the windows sweat and frost.

because it makes the windows sweat and frost.

That may be all right from the janitor's point of view

That may be all right from the janitor's point of view,

but it is all wrong from the point of view of the woman who is to breathe the air. And whose say should go? (E 1193)

but it is all wrong from the point of view of the people who are to breathe the air.

[contd] When air is at 72° and has 50 per cent humidity it is not far from right.

51:5.3 When air is at 72° F. and has 50 per cent humidity it is not far from right.

If anything chills it to 52° the dew point is reached and the water of the air precipitates on the cold surface.

If anything chills it to 52° F. the dew point is reached and the water of the air precipitates on the cold window surface.

On a cold day the window glass is far below this temperature

On a cold day the window glass is far below this temperature

and it follows that if there is not water on the glass there was little in the air—too little for the health of human beings (E 1193).

and it follows that if there is not water on the glass there was little in the air—too little for the health of human beings.

[contd] Of this you can be certain: the house where the windows do not sweat and frost is not fit for human habitation.

51:5.4 Of this you can be certain: the house where the windows do not sweat and frost is not fit for human habitation.

The school with clear windows is wasting the taxpayers' money, the teachers' time and the pupils' health.

The school with clear windows is wasting the taxpayers' money, the teachers' time and the pupils' health.

The office with clear windows is a place where employees have more than the average of colds, pneumonia and minor infections (E 1193).

The office with clear windows is a place where employees have more than the average of colds, pneumonia and minor infections.

[contd] When the weather gets warm sweating windows have not the same significance.

51:5.5 When the weather gets warm sweating windows have not the same significance.

At that season they mean humidity which is too high for comfort and, in some measure, for health.

At that season they mean humidity which is too high for comfort and, in some measure, for health.

SOURCE	51: ESSENTIALS OF HEALTHFUL LIVING
In midwinter beware the house that has not frosted windows (E 1193).	**In midwinter beware of the house that has not frosted windows.**
WHY FLOWERS DIE (Evans 1195)	
[contd] **When a woman has bought a nice fern in a pot of good, black dirt she wants to have it live.**	51:5.6 **When a woman has bought a nice fern** or other plant **growing in a pot of good, black dirt she wants it to live.**
She places it in her sitting room and takes pride in its care.	**She places it in her sitting room and takes pride in its care.**
Presently she is distressed to find it dying.	**Presently she is distressed to find it dying.**
In her eagerness she may visit a florist to discover how he succeeds in keeping his plants alive while she fails (E 1195).	**In her eagerness to learn she may visit a florist to discover how he succeeds in keeping his plants alive while she fails.**
[contd] *If she goes to his greenhouse*	51:5.7 If the woman whose flowers die at home will go to a greenhouse
she will find the temperature around 70°, the humidity around 90, the ground fairly moist,	**she will find the temperature around 70° F., the humidity around 90, the ground fairly moist,**
and the plants getting some sunlight every bright day.	**and the plants getting some sunlight every bright day.**
When she goes back she finds that her plant is in air which is at 80°,	When she goes back home she finds that her dying plant is in air which is 75° or 80° F.,
with a humidity of 20, and maybe sunlight does not strike it.	with a humidity of about 20, and maybe sunlight does not strike it.
If she modifies the conditions her plant will live; otherwise it will not.	If she modifies the conditions her plant will live; otherwise it will die.
She can bring the temperature as low as 70°.	**She can bring the temperature as low as 70° F.**
She cannot bring the humidity up to 90 but she can bring it up to 40 or 50	**She cannot bring the humidity up to 90, but she can bring it up to 40 or 50,**

and she can give her fern some sunlight on days when the sun is shining (E 1195).

WET BULB THERMOMETERS (Evans 1195)

The humidity of the air is measured by an instrument called a hygrometer.

The instrument advised consists of two thermometers set side by side.

The bulb of one of these is surrounded by a loosely woven wick.

This wick ***draws water from a near-by cup so that from the surface of this bulb water is evaporating continuously*** (E 1195-96).

[contd] ***This thermometer is called the wet bulb thermometer and its companion the dry bulb*** (E 1196).

[contd] **From the difference between the reading of these two thermometers the humidity of the air is found on a table attached to the instrument.**

[*Note:* Sadler's table appears to be adapted from Fig. 87. RELATIVE HUMIDITY TABLE (Rosenau 695).]

Therefore, when one uses this kind of a hygrometer he has two thermometers at his service—

and she can give her fern some sunlight on days when the sun is shining.

WET BULB THERMOMETERS

51:6.1 The humidity of the air is estimated and measured by an instrument called a *hygrometer.*

This instrument consists of two thermometers set side by side.

The bulb of one of these is surrounded by a loosely woven wick,

which draws water **from a nearby cup so that from the surface of this bulb water is evaporating continuously.**

This thermometer is called the wet bulb thermometer and its companion the dry bulb.

51:6.2 **From the difference between the readings of these two thermometers the humidity of the air is found on a table attached to the instrument**

and reproduced herewith.

RELATIVE HUMIDITY TABLES—FAHRENHEIT: Temperature Readings in Degrees Fahrenheit. Relative Humidity Readings in Per Cent. Barometric Pressure 29.0". Difference in Degrees Fahrenheit Between Wet and Dry Bulb Thermometers

Thus we have two thermometers to reckon with—

one of the ordinary kind called the dry bulb and one of a kind new to him, the wet bulb (E 1196).

one of the ordinary kind, called the dry bulb, and one of a new kind, the wet bulb.

[contd] **Under ordinary office conditions in January** he **will find that the dry bulb thermometer registers about 16° higher than the wet bulb, say 72° and 56° respectively** (E 1196).

51:6.3 **Under ordinary office conditions in January** you **will find that the dry bulb thermometer registers about 16° F. higher than the wet bulb, say 72° and 56° F. respectively.**

[contd] **In talking about temperatures we always speak of the temperature shown by the dry bulb thermometer.**

51:6.4 **In talking about temperatures we always speak of the temperature shown by the dry bulb thermometer.**

Now, a group of physiologists are saying that the thermometer we ought to go by is the wet bulb (E 1196).

Many physiologists think that we ought to go by the wet bulb thermometer.

Their argument is that the human body is a wet bulb and not a dry bulb.

Their argument is that the human body is a wet bulb and not a dry bulb machine.

A man evaporates one or two pints of sweat from the skin every day. Therefore he is a wet bulb (E 1196).

A man evaporates one or two pints of sweat from the skin every day,

not to mention loss of moisture from the lungs.

[contd] On this basis the temperature of the room is 56° instead of 72°, as he thought.

On this basis the temperature of the room is really 56° instead of 72° F.,

Somehow he felt a little cold but it could not be—the thermometer read 72° (E 1196).

as shown by the dry bulb thermometer.

51:6.5 Says Dr. W. A. Evans:[4]

[contd] If a man were to fall in a pond and go around with his wet clothes on he would be a wet bulb.

51:6.6 If a man were to fall in a pond and go around with his wet clothes on he would be a wet bulb.

As it is he is only a slightly moist bulb.

As it is he is only a slightly moist bulb.

SOURCE	51: ESSENTIALS OF HEALTHFUL LIVING
To figure him on the same basis as the wet bulb is to overstate the case (E 1196).	To figure him on the same basis as the wet bulb is to overstate the case.
[contd] A compromise somewhere down the line, say about half way, would hit it off—	A compromise somewhere down the line, say about half way, would hit it off—
such as to say that the temperature of the room for anything that is dry is 72° and for anything that is wet 56°, while for everything about as moist as a man it is 64° (E 1196).	such as to say that the temperature of the room for anything that is dry is 72° and for anything that is wet 56°, while for everything about as moist as a man it is 64°.
[contd] **There is no doubt at all that the discomforts of extremes of temperature are better measured by the wet bulb than the dry bulb thermometer** (E 1196).	51:6.7 **There is no doubt at all that the discomforts of extremes of temperature are better measured by the wet bulb than the dry bulb thermometer.**
[contd] **It is when the wet bulb thermometer shows over 70° that men keel over in laundries, in kitchens and in some factories.**	51:6.8 **It is when the wet bulb thermometer shows over 70° F. that men keel over in laundries, in kitchens, and in some factories.**
It is when the wet bulb thermometer shows under 56° that the throat dries out and colds are contracted that the skin dries out and winter itch develops (E 1196).	**It is when the wet bulb thermometer shows under 56° F. that the throat dries out and colds are contracted, that the skin dries out and winter itch develops.**
[contd] **If a person can only afford one thermometer a wet bulb will tell him more than a dry bulb;**	51:6.9 **If a person can only afford one thermometer, a wet bulb will tell him more than a dry bulb;**
yet he ought to have a dry bulb as it is what everybody refers to when they speak of temperatures (E 1196).	**yet he ought to have a dry bulb, as it is what everybody refers to when they speak of temperatures.**
[contd] **The fact is, everyone should have both.**	**The fact is, everyone should have both.**
It would pay to save in some other direction (E 1196).	**It would pay to save in some other direction.**

SOURCE

IV, II: PRESSURE, TEMPERATURE, AND HUMIDITY (Rosenau 681)

HUMIDITY (Rosenau 689)

Effects of Warm Dry Air.— ... The problem of constructing buildings

in such a way as to keep the interior up to a fair degree of humidity is a large one.

So far engineers have made little practical progress toward its solution.

Satisfactory devices may be had to improve the moisture in large public buildings,

but these devices have so far proved too expensive for private dwellings, offices, or schoolrooms (R 702).

[contd] The humidity in living rooms may be improved by setting about growing plants and porous dishes, such as flower pots full of water.

If such receptacles are set near electric fans evaporation is facilitated. Pans or pots of water may also be placed upon the radiator (R 702).

51: ESSENTIALS OF HEALTHFUL LIVING

PRACTICAL SUGGESTIONS

51:7.1 The problem of constructing buildings

so as to keep the interior up to a fair degree of humidity is a difficult one.

So far engineers and architects have made little practical progress toward its solution.

Satisfactory devices may be had to improve the moisture in large public buildings,

but these devices have so far proved too expensive for private dwellings, offices and schoolrooms.

51:7.2 The humidity in living rooms may be improved by growing plants.

Pans or pots of water may also be placed upon the radiator, and if electric fans are utilized evaporation may be further facilitated.

LVI: VENTILATION—HEATING—HUMIDITY (Evans 1144)

HUMIDITY (Evans 1193)

A PRACTICAL SUGGESTION (Evans 1196)

[contd] The suggestion relates to a method of humidifying air in a room heated by steam. **On the market there are several devices which are to be attached to the radiator for the purpose of allowing steam to escape.**

The practice is to attach this device to the far end of the radiator, the end at which the steam leaves the coils (E 1196).

[contd] **One objection to these devices is that when several of the coils are filled with water, as often happens with poorly installed heating plants,**

water escapes from the humidifier (E 1196-97).

The suggestion is that the humidifier be attached at the front end—the end where the steam enters,

the end where you turn the steam on, the dry end.

Generally the radiator coils have a plugged opening in this first coil.

It has threads ready for the threads of the humidifier.

By attaching the humidifier at this end water will not leak from it (E 1197).

51:7.3 **On the market there are several devices which may be attached to the radiator for the purpose of allowing steam to escape.**

The practice is to attach this device to the far end of the radiator, the end at which the steam leaves the coils.

One objection to these devices is that when several of the coils are filled with water, as often happens with poorly installed heating plants,

water instead of steam **escapes from the humidifier.**

The suggestion is that the humidifier be attached at the front end—the end where the steam enters,

the end where you turn the steam on, the dry end.

Generally the radiator coils have a plugged opening in this first coil.

It has threads ready for the threads of the humidifier.

By attaching the humidifier at this end water will not leak from it.

SOURCE

RAISING THE HUMIDITY (Evans 1199)

Next in efficiency come kettles of water setting on the stove (E 1199).

If several boxes of growing flowers be kept in the room

and the soil kept as wet as they will stand soil evaporation and plant exhalation will add much moisture to the air (E 1199).

Lastly comes the use of patent humidifiers.

These hang on the radiators and the water in them gets approximately as warm as the radiator coils (E 1200).

II: AIR (Harrington 281)

AQUEOUS VAPOR (Harrington 296)

At low temperatures, saturated air causes a greater withdrawal of heat than dry air,

and intensifies the sensation of cold;

for moist air is a much better heat conductor.

Cold dry air is much more comfortable than air some degrees warmer but materially moist.

In the very cold climate of eastern Siberia, the air is so dry that 50° to 60° below zero F. is no hardship,

provided one wears completely dry clothing, while with moist clothing one would perish in a very short time.

51: ESSENTIALS OF HEALTHFUL LIVING

51:7.4 Humidity is also increased by keeping a teakettle boiling on the stove.

Flowers growing in the living rooms

also help to keep up humidity—if they are kept well watered.

51:7.5 **Lastly comes the use of patent humidifiers,**

which hang on the radiators.

51:7.6 **At low temperatures, saturated air causes a greater loss of heat by the body than dry air,**

and thus **intensifies the sensation of cold;**

for moist air is a much better heat conductor.

Cold dry air is much more comfortable than air some degrees warmer, but materially moist.

51:7.7 **In the very cold climate of eastern Siberia, the air is so dry that 50° to 60° below zero F. is no hardship,**

provided one wears completely dry clothing, while with moist clothing one would perish in a very short time.

SOURCE	51: ESSENTIALS OF HEALTHFUL LIVING
Some parts of Siberia are both cold and damp, and hence uninhabitable.	Some parts of Siberia are both cold and damp, and hence uninhabitable.
Atmospheric moisture has, therefore, directly opposite effects; it intensifies the effects of heat and also those of cold (H 298).	Atmospheric moisture has, therefore, directly opposite effects; it intensifies the effects of heat and also those of cold.
	51:7.8 We must not forget that too high humidity is very dangerous—enough is good—but too much is dangerous.
ORGANIC MATTERS (Harrington 307)	
Influence of Fog. (H 317)	
It is a well-recognized fact that, during periods of heavy fogs in manufacturing centers,	It is a well-recognized fact that, during periods of heavy fogs,
the morbidity and mortality from respiratory disease are increased very greatly, and that, as the atmosphere clears, a sharp decline follows.	the morbidity and mortality from respiratory diseases are increased very greatly, and that, as the atmosphere clears, a sharp decline follows.
In London, for example, the usual death-rate from all causes has been known to become almost doubled during a fortnight of continued dense, smoky fog,	In London, for example, the usual death rate from all causes has been known to become almost doubled during a fortnight of continued dense, smoky fog,
and then to return to its normal figure with the advent of clear weather,	and then to return to its normal figures with the arrival of clear weather,
the increase being due particularly to bronchitis and other affections of the respiratory tract,	the increase being due particularly to bronchitis and other affections of the respiratory tract,
attributed to the irritating influence of the finely divided particles of soot and the acids which accompany them (H 318).	attributed to the irritating influence of the finely divided particles of atmospheric soot and the acids which accompany them.

LVI: VENTILATION—HEATING—HUMIDITY (Evans 1144)

HUMIDITY (Evans 1193)

METHOD OF HUMIDIFYING (Evans 1194)

Sometimes we are told that humidifying the air will save coal.

This is not true.

Kimball says:

"A simple calculation will demonstrate that, approximately, four times as much fuel is required to evaporate the water required to produce 50 per cent humidity at 68 degrees as is saved by reducing the temperature from 76 to 68 degrees" (E 1195).

51:7.9 **Sometimes we are told that humidifying the air will save coal.**

This is not true.

Kimball says:

"A simple calculation will demonstrate that, approximately, four times as much fuel is required to evaporate the water required to produce 50 per cent humidity at 68 degrees as is saved by reducing the temperature from 76 to 68 degrees."

1. Most of this section consists of Sadler paraphrasing Rosenau rather than copying him verbatim.

2. Sadler quoted this passage to give the reader the false impression that the rest of the text was original to Sadler.

3. In this section Sadler seems to have taken care to paraphrase rather than to copy verbatim.

4. W. A. Evans wrote the introduction to *The Essentials of Healthful Living.* Had he read Sadler's manuscript and recognized that Sadler had plagiarized from *Dr. Evans' How to Keep Well: A Health Book for the Home*?