

**A RUDIMENTARY TREATISE ON WARMING  
AND VENTILATION; BEING A CONCISE  
EXPOSITION OF THE GENERAL  
PRINCIPLES OF THE ART OF WARMING AND  
VENTILATING DOMESTIC AND PUBLIC  
BUILDINGS, MINES, LIGHTHOUSES, SHIPS, &C.**

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A Rudimentary Treatise on Warming and Ventilation; Being a Concise Exposition of the General Principles of the Art of Warming and Ventilating Domestic and Public Buildings, Mines, Lighthouses, Ships, &C. by Charles Tomlinson

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**CHARLES TOMLINSON**

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BY

CHARLES TOMLINSON.

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# WARMING & VENTILATION.

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## INTRODUCTION.

ON THE PHYSICAL AND CHEMICAL PRINCIPLES CONCERNED IN THE  
ART OF WARMING AND VENTILATION.

AN inquiry into the constitution and uses of our atmosphere in the economy of nature and art, is calculated to promote a solemn feeling of admiration and gratitude. This wonderful creation encloses within its capacious curves, like a vast dome, the widely extended kingdoms of nature, to which it ministers materials for growth, health, and enjoyment, and by its transparency reveals to intelligent beings a glimpse of other creations beyond its limits. At one time, it stands in simple grandeur as a vault of tender blue, displaying the glorious sun and the landscape smiling beneath; at another time, its surface is chequered with fleecy clouds,—“the beauteous semblance of a flock at rest,”—or alpine heights of more than silvery brightness, or huge piled up masses, dark and frowning; all contributing to form wondrous variety and beauty in the aerial scenery, and giving to the landscape below the ever varying charms of light and shade. Again, the blue of this splendid ceiling becomes deeper and deeper, and bright golden points shine out here and there, increasing in number until the whole surface appears as if richly studded with gems.

If these great and glorious sights were of rare occurrence, or could only be witnessed from a few chosen spots on the earth's surface, they would stimulate our curiosity, and we should eagerly hasten to those spots, or read the descriptions and gaze at the pictures which travellers and artists had pre-

pared for us. Their common occurrence, however, causes them to be viewed with indifference; but there are also many hidden wonders connected with the atmosphere equal in beauty to those which appeal directly to the eye, but requiring study for their due appreciation. The atmosphere is a scene of incessant restless activity. The heat of the tropical sun upon the earth sets the air in motion, rarefies and causes it to ascend; meanwhile the air from cooler regions rushes towards the equator to supply the vacuum, performing various useful offices on its way. Here it is the trade wind or the monsoon; there it is the sea or the land breeze; in a third place, it is the hill and valley breeze, all giving health and refreshment to places which otherwise might be uninhabitable. Meanwhile the heated ascending air of the equator proceeds on its useful mission in the direction of the poles, forming an upper current, descending in some places and mitigating the cold of temperate regions, as the under current tempers the heat of tropical climes. The heat, too, which gives force and activity to these aerial currents or vast natural ventilators, also raises the waters of the ocean and charges the air with moisture; this moisture ascends and forms clouds, those busy and active water-carriers which traverse the unobstructed regions of the sky, and pour down their treasures on the city and the plain, and on the desert where no water is, filling the mountain cisterns, whence gush out the springs and rivers; and these descend in a meandering course, and diffuse beauty and blessing on the lower lands long after the rain cloud has been dissolved. It is the resistance of the atmosphere that causes the rain to come down in gentle drops, and thus gradually to diffuse its refreshing influence, instead of falling in torrents and cataracts, as it otherwise would, without the retarding and separating influence of the air. It is the atmosphere which dispenses the white fleecy flakes of snow to the temperate regions, whereby the earth is covered and protected from the chilling influence of a low temperature; the air, too, is the region of mists and fogs,

which bring moisture in a still more gradual manner ; a cold current of air blowing over a warmer stratum of air, and cooling it, thereby rendering its moisture visible ; or, after sun-set, the river may be warmer than the air, and the escaping vapour condense into large rolling masses. But we especially notice the beneficial effects of differences of temperature between the air and the earth in the formation of dew ; the moisture which the heat of the day had exhaled from the earth is deposited when a cloudless sky allows the earth to radiate its heat into space, and to cool down below the temperature of the air ; the refreshing moisture is then condensed upon vegetation and upon surfaces where it is most needed.

Not only are we able to trace in the atmosphere those great and regular motions which bring about an interchange between the air of the equator and that of either pole, but there are other motions, apparently more fitful and irregular, in the winds, which blow from all points of the compass, and tend perpetually to restore the equilibrium of heat and moisture.

How wonderful, too, is the action of the atmosphere on light. By its means the sun's rays are diffused, and their influence extended from the sunshine to the shade. Were it not for the atmosphere, the sun would shine in an intensely dark sky, and no object would be visible unless the solar rays fell directly upon it. Sun-set would be a sudden transition from light to darkness ; and sun-rise a painful change from intense darkness to intense light. But under the present wise and providential arrangement, the transition from day to night is calm and peaceful ; the sun departs in splendour, like a monarch attended by a gorgeous court, leaving a mild and subdued scene of beauty behind ; the soothing influences of evening gradually steal upon us, and new scenes of wonder and beauty gradually become unfolded. After some hours of peace and rest, the portals of the eastern sky slowly open, and one rosy messenger after another ascends to announce the advent of the king of day.