ELEMENTS OF METEOROLOGY, WITH QUESTIONS FOR EXAMINATION, DESIGNED FOR SCHOOLS AND ACADEMIES

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649198320

Elements of meteorology, with questions for examination, designed for schools and academies
by John Brocklesby

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

www.triestepublishing.com

JOHN BROCKLESBY

ELEMENTS OF METEOROLOGY, WITH QUESTIONS FOR EXAMINATION, DESIGNED FOR SCHOOLS AND ACADEMIES

Trieste

ELEMENTS

OF

METEOROLOGY,

WITH QUESTIONS FOR EXAMINATION,

DESIGNED FOR SCHOOLS AND ACADEMIES.

BY JOHN BROCKLESBY, A.M.,
Professor of Mathematics and Natural Philosophy in Trinity College, Hartford.

See page 331.

ILLUSTRATED WITH ENGRAVINGS.

TENTH REVISED AND ENLARGED EDITION.

"Fire and hail; snow and vapor;
Stormy wind fulfilling His word."

NEW YORK:
SHELDON AND COMPANY, PUBLISHERS,
498 BROADWAY.
1869.

CASE, LOCKWOOD & CO.,
ELECTROTYPERS AND PRINTERS,
HARTFORD, CONN.

PREFACE.

METEOROLOGY is a subject of interest to all. We live in the very midst of its phenomena, and are constantly subjected to their influence. Many of the singular processes of nature which this science unfolds, are intimately connected with our being and happiness, while others, on account of their beauty and sublimity, fill the mind with admiration and awe.

The subject being one of universal interest, we might naturally suppose it to be universally understood; but such is not the case. Meteorology, as a science, is of recent origin; for it is only within the space of a very few years that it has risen, through the efforts of many gifted minds, to the rank it deserves to hold amid the various departments of knowledge.

Meteorology is a portion of Natural Philosophy, and in the colleges of our land, lectures upon this subject form a part of the regular academical course; but no similar system prevails in our High Schools and Academies. Nor is it to be expected; since, with the present want of facilities for obtaining information, the teacher would be obliged to devote an undue share of his time to the acquisition of the knowledge requisite for this object. Neither can a *text-book* be procured; for the author is not aware that any *distinct treatise* on this science is extant in the English language, except the

translation from the German of Kaemtz's "Complete Course of Meteorology;" a work which, though exceedingly valuable to the advanced student, is not suitable for a text-book on account of its *size*, *expense*, and *mode of execution*.

The present little work has therefore been prepared, not with the view of adding *one more* to the long list of studies now pursued in our academical institutions; but for the purpose of bringing into general notice a rich but hitherto comparatively unknown field, within the domains of natural science.

The author has therefore endeavored, while retaining all the important principles of Meteorology, to condense the subject as much as possible, in order that this elementary treatise may be studied in connection with Natural Philosophy, without consuming too much time.

In regard to *facts*, they have been sought wherever it was supposed they could be found, and reference has been made in nearly all cases to the authorities whence they were taken.

Should it be required a more extended treatise may be expected, adapted to the wants of students in colleges.

HARTFORD, July 7th, 1848.

REFERENCES.

(C. 957), for example, denotes Comstock's Philosophy, Article 957, (last edition.

(Art. 122), for example, denotes Article 122 of this work.

METEOROLOGY.

1. METEOROLOGY IS THAT BRANCH OF NATURAL SCIENCE WHICH TREATS OF THE ATMOSPHERE AND ITS PHENOMENA. The subject may be properly divided into *six parts*.

2. PART I. THE ATMOSPHERE.

PART II. AERIAL PHENOMENA—*comprehending Winds in general, Hurricanes, Tornadoes, and Water-spouts.*

PART III. AQUEOUS PHENOMENA—*including Rain, Fogs, Clouds, Dew, Hoar-frost and Snow, and Hail.*

PART IV. ELECTRICAL PHENOMENA—*comprising Atmospheric Electricity and Thunder-storms.*

PART V. OPTICAL PHENOMENA—*including the Color of the Atmosphere and Clouds, Rainbow, Mirage, Coronas, and Haloes.*

PART VI. LUMINOUS PHENOMENA—*embracing Meteorites, Shooting Stars and Meteoric Showers, and the Aurora Borealis.*

PART VII. MISCELLANEOUS PHENOMENA—*including the Fall of Terrestrial Substances foreign to the Atmosphere, and Dry Fog and Indian Summer Haze.*

What is Meteorology?
Into how many parts is it divided?
Rehearse the several parts with their subjects.

PART I.

OF THE ATMOSPHERE.

3. As the common properties of the air, viz., *weight*, *fluidity* and *elasticity*, are supposed to be already known, (C. 502.) we shall proceed at once to the discussion of the entire body of air, termed the atmosphere; and first of its pressure, which is ascertained by the *barometer*, an instrument so called from the Greek words, *baros*, weight, and *metron*, measure.

BAROMETER.

4. This instrument is of the highest importance in Meteorology, and requires a minute description. It is thus constructed. Into a glass tube, about three feet in length, open at one end and closed at the other, mercury is poured until it is full; the open end being now closed by the finger, or any other means, the tube is inverted, and the lower end immersed in a vessel of mercury. When beneath the surface of the fluid the end is unstopped, and the column of mercury within the tube then settles down, until its summit is about *thirty* inches above the level of that within the vessel. The space above the column in the tube is a void, and is called the *Torricellian vacuum*, from Torricelli, the name of the Italian philosopher, who first constructed this instrument.

5. *The column of mercury within the tube is supported above the level of that in the vessel, by the upward pressure of a column of the atmosphere, having the same base as itself.*

What is the atmosphere?
How is its pressure ascertained?
How is the barometer made?
What supports the column of mercury?

6. Thus, in fig. 1., the atmospheric column *a a*, of indefinite length, but of the same size as the barometric column Db, presses upon the mercury in the vessel, K, with a force equal to its own weight; now since any force, acting upon a fluid, is communicated in every direction, this pressure will be transmitted through the mercury, in the direction of the arrows, and acts at D, within the tube, against the mercurial column Db. This upward force will be resisted at D, by the weight of Db, and the mercury will sink in the tube until the two pressures counterpoise each other, in exactly the same manner as two equal weights in the opposite scales of a balance.

Fig. 1.

BAROMETER.

7. From these considerations, it is manifest, that the *weight of the atmospheric column a a is equal to that of the mercurial column*, Db *of the same base*; and this weight can be estimated in the following manner. If the base at D contains one square inch, the column Db, at its usual height, will contain, nearly, 30 cubic inches; and since one cubic inch of mercury weighs 3426.76 grains, the weight of thirty will amount to 102802.8 grains.

This product being now divided by 7001, the number of grains in a pound avoirdupois, the result will be nearly 14.7 lbs.; a quantity equal to the weight of the barometric column, and consequently to the pressure of the atmosphere on every square inch of surface.

8. Any *increase* in the density of the atmosphere will be denoted by an *elevation* of the mercury, and a *decrease* by its *depression*. The cause of this is obvious, in the first case, *a a* becomes heavier, and requires more

---

Explain Figure 1.

How is the pressure of the atmosphere, on every square inch, computed?

How does any change in the density of the air affect the height of the barometer?