

THE MOTIONS OF THE ATMOSPHERE AND ESPECIALLY ITS WAVES.*

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The inadmissibility of those views according to which the motions of the atmosphere consist in the development of independent cyclones and anti-cyclones is, of late years, more and more plainly recognized. This conclusion has been arrived at, not so much through a severe criticism of the fundamental basis upon which these erroneous views had been established, as by the power of the facts that resisted introduction into this artificial system.

It is now nearly ten years since the theory of cyclones began to totter, and especially under the influence of a memoir published by Hann.† Following soon upon this the idea was developed by von Helmholtz‡ (*Berlin Sitzungsab.*, 1888), "that in the atmosphere, by continuously acting forces, the formation of surfaces of discontinuity is possible, and that the anticyclonic motion of the lower strata and the extensive, gradually increasing cyclone of the upper strata that are to be expected around the north and south poles, resolve themselves into a great number of *irregularly* progressing cyclones and anticyclones with an excess of the former." Von Helmholtz further says§ (*Berlin Sitzungsab.*, 1889): "if as in the case of the earth, the lower stratum is the denser, then it can be shown that the disturbances must at first proceed as do the waves of water raised by the wind." In this way the origin of cyclones and anticyclones is traced back to the general atmospheric circulation which is itself dependent on the difference in temperature between the equator and the poles; but the cyclones and anticyclones when once formed can still be considered as independent phenomena complete within themselves.

* Translated from *Verhandlungen der Gesellschaft Deutscher Naturforscher und Aerzte*, pp. 42-50 and 323-324, by Professor CLEVELAND ABBE.

† Comp. von Bezold, *Berliner Sitzungsberichte*, math.-nat. Kl., 1890, p. 831.

‡ Translated at pages 92, 93 of the *Mechanics of the Earth's Atmosphere*.

§ Translated at page 94 of the *Mechanics of the Earth's Atmosphere*.