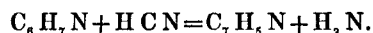


The brown distillate contains a large proportion of aniline which has escaped decomposition, and which may be readily separated by treatment of the distillate with an acid. On rectifying the portion of the oil which is insoluble in acid, the thermometer becomes stationary at 80°, when a colourless transparent liquid distils, possessing all the properties of benzol; it was identified, moreover, by transformation into nitrobenzol and aniline. The thermometer then rapidly rises, becoming stationary again at between 190° and 195°; a limpid oil lighter than water passes over, which by its odour is at once recognized as benzonitrile\*. To remove every doubt, this oil was boiled with an alcoholic solution of potash, when torrents of ammonia were evolved, benzoate of potassium remaining as a residue. The benzoic acid was separated from the salt by addition of hydrochloric acid, and converted into the silver-salt, which was identified by analysis.

The formation, under these circumstances, of benzonitrile is probably due to a reaction at a higher temperature between aniline and the hydrocyanic acid generated during the destruction of another portion of this substance,



The action of heat upon aniline gives rise, in addition, to the formation of small quantities of a crystalline indifferent substance, and an oily base boiling at a very high temperature; the nature of both these substances I have not yet determined.

The transformation of aniline into benzonitrile is thus seen to be far from elegant; and if it have any claims to notice, it is merely because there are at present comparatively few reactions known which permit a passage from a hydrocarbon,  $C_nH_{2n-6}$ , to an acid,



This transformation may possibly be used for the production of several of the higher terms of the series of aromatic acids which have not yet been obtained.

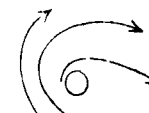
\* I have lately had an opportunity of observing that benzonitrile solidifies in a mixture of solid carbonic acid and ether. The beautifully crystalline mass fuses again at -17°.

IV. "A Development of the Theory of Cyclones." By FRANCIS GALTON, F.R.S. Received December 25, 1862.

Most meteorologists are agreed that a circumscribed area of barometric depression is usually a locus of light ascending currents, and therefore of an indraught of surface winds which create a retrograde whirl (in our hemisphere), because they bring to their destination a lateral impulse, partly due to the greater easterly speed of the earth's surface whence the southern portion of the indraught took its departure, and partly due to the less easterly, or we may say greater westerly, speed of its northern portion.

Conversely, we ought to admit that a similar area of barometric elevation is usually a locus of dense descending currents, and therefore of a dispersion of a cold dry atmosphere, plunging from the higher regions upon the surface of the earth, which, flowing away radially on all sides, becomes at length imbued with a lateral motion due to the above-mentioned cause, though acting in a different manner and in opposite directions. The currents necessarily travel with diminished radial speed as they widen out from their central area of dispersion, and the eastward tendency of the northern portion of the system and the westward tendency of the southern become more overpowering. It may be presumed, on consideration of the extreme mobility of the air, that a continuous dispersion of currents would result in the yielding of the east and west winds, which had no tangential movement of their own, to the curvature of the others, and that we should witness a disposition of currents like those in the annexed diagram, which is copied from an actual occurrence on December 2, 1861. The appearance is that of a centre of calms whence currents flow in radial lines, rapidly curving to the right and forming a sort of "anticyclone."

Fig. 1.



Dove's law of gyration is so fertile in result, that it accounts for the same direct rotation of a cold wind by a wholly different process. As an antithesis to his theory of cyclones being due to an equatorial current pressing against quiescent air, he adds (Law of Storms), with a view of illustrating his position, and not of meeting cases that practically occur, polar cyclones, "if they exist," would have a direct rotation.

It is not necessary to allude further to his well-known theory—it is sufficient to show that two separate causes cooperate in producing a rotation or curvature of currents such as I have described. I have not the slightest doubt that a strong curvature of atmospheric currents to the right does frequently exist, owing to the descent of cold air from above; for in lately charting the weather of Europe thrice daily during a month, I found it more or less present on from fifty to sixty occasions. Its existence is consonant to what we should expect. It is hardly possible to conceive masses of air rotating in a retrograde sense in close proximity, as cyclonogists suppose, without an intermediate area of direct rotation, which would, to use a mechanical simile, be in gear with both of them, and make the movements of the entire system correlative and harmonious.

The result I have thus far arrived at, and which I should look for hereafter, is that whenever the barometer shows circumscribed areas of marked elevation and depression at distances not exceeding 1500 miles apart, a line drawn from the locus of highest to that of lowest barometer would be cut by parallel wind-currents at an angle of about  $45^\circ$ , in the way shown in the diagram.

I doubt if it be of advantage to investigate the changes of wind produced by a system of indraught and dispersion passing over any locality, because the barometrical sections vary so rapidly as to make the incoming portion unsymmetrical with that which has already passed over.

V. "On the Immunity enjoyed by the Stomach from being digested by its own Secretion during Life." By FREDERICK W. PAVY, M.D. Communicated by Dr. SHARPEY, Sec. R.S. Received December 11, 1862.

(Abstract.)

The author referred to the communication by John Hunter "On the Digestion of the Stomach after Death," published in the 'Philo-

sophical Transactions' for 1772. In this communication Hunter notices that in occasional instances, especially in persons who have died of sudden and violent deaths, the stomach is found on inspection to have undergone solution, to the extent of perforation, from the action of its own secretion upon it. Hunter considered that this could only have taken place after death; and to account for why the same occurrence did not ensue during life, he adduced the living principle as constituting the protecting agent. The fact that parts of living animals, as shown by Claude Bernard of Paris, are susceptible of digestion when introduced through a fistulous opening into a digesting stomach, proved that Hunter's explanation does not stand the test of experiment. The author corroborated Bernard's results upon frogs, and referred to an experiment in which he had also obtained the digestion of the extremity of the ear of a living rabbit.

The view at present most generally entertained is, that the epithelial lining or mucus protects the stomach from undergoing digestion during life. This it is supposed is acted upon and dissolved, but being as constantly renewed, the stomach escapes injury. There being no longer the power of producing epithelium after death, accounts for the occurrence of the solution that may then be observed.

To test this view, the author removed a patch of mucous membrane about the size of a crown piece from the stomach of the dog. Food was afterwards digested without, however, the denuded stomach showing the slightest sign of attack. It thus appearing that the stomach resisted digestion notwithstanding the assumed protecting layer had been removed, it became evident that something besides the epithelial lining was required to account for the security enjoyed.

Seeing that the question was still open for explanation, the following was the view propounded by the author. The existence of acidity, it was first remarked, is an absolutely essential condition for the accomplishment of the act of digestion. During life the walls of the stomach are most freely permeated by a current of alkaline blood. Under such circumstances it would appear impossible that any digestive action could be effected. There would be one condition that would neutralize the other. Acidity is needful for digestion, and alkalinity is a constant character of the blood. As long therefore as so free a circulation of this alkaline fluid should be maintained (and

Fig. 2.

