dissolved oxygen and acquired a supply only by diffusion from the atmosphere.

If ocean waters were aerated solely by diffusion from the atmosphere we should expect the upper strata to possess a larger amount of dissolved oxygen than the lower. But such is not the case in the tropical Atlantic, for instance. Here the smallest amounts, one to two cubic centimeters per liter of water, are found between the depths of 150 and 800 meters, while the water between 1,100 and 1,500 meters contains twice as much or more, that is, three to four cubic centimeters per liter.[4]

The Black Sea affords an excellent illustration of the inefficiency of diffusion in the process of aeration. Owing to the greater salinity, hence greater density, of the lower water the vertical currents do not penetrate to the bottom of the sea; that is, the lower portion is permanently stagnant and oxygen can pass into it only by diffusion. But Lebedinzeff[5] found no dissolved oxygen below a depth of 200 meters, the aerated portion comprising only about eight per cent. of the maximum depth of this body of water.

Similar conditions are found in many fresh-water lakes during the summer period of thermal stratification. At this time the cool lower stratum of water is cut off from contact with the air by the warm upper stratum and can receive new supplies of oxygen only by diffusion from the latter. If the former loses any or all of its dissolved oxygen during the stagnation period, however, the deficiency continues until the autumnal overturning takes place.[6]

In view of these facts it is evident that some agent other than diffusion is responsible for the aeration of bodies of water. In lakes aeration is accomplished by the vernal and autumnal overturning of the water and its subsequent circulation for a longer or shorter period. In speaking of the aeration of ocean waters Helland-Hansen[7] states that "these gases are absorbed at the surface from the atmosphere and are carried by currents even into the deepest parts of the ocean in varying amounts."

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4 Schott, "Physische Meereskunde," p. 72.

5 "Aus der Fischzuchtanstalt Nikolsk," No. 9, p. 113.

6 Birge and Juday, Bull. XXII., Wis. Geol. and Nat. Hist. Survey.

7 "The Depths of the Ocean," p. 253.

AN ANOMALOUS EFFECT OF RÖNTGEN RAYS

AN unexpected effect due to X-rays has been brought to my attention, which I believe has been hitherto unobserved. The result is obtained as follows:

Let a sensitive plate be placed film down upon a silver coin, and let a second silver coin be so placed above the plate that areas of contact of the plate and coins partially overlap. Now let the plate and coins which are enclosed in a light-tight box be exposed to X-rays from above.

When the plate is developed, the result is of course a light area with but little effect due to radiation transmitted by the upper coin and a dark area due to the secondary radiation from the coin below. The anomaly appears at the area of overlapping coins. Since this receives its impression both from transmitted rays and from the secondary rays from the coin below, it is to be expected that this area will be darker than the remaining area shaded by the upper coin. The opposite is true, and the area of the overlapping coins is always lighter, *as though the secondary radiation from the lower coin cancelled the effect of the rays transmitted by the upper coin.* When small plates of lead are substituted for the silver coins, the effect is reversed, and the area in question is *darker* instead of lighter. This is the result that one would expect.

The writer has tried many combinations of metals in this manner and has found that the anomalous effect occurs in a number of cases, as for two gold coins, copper coins, gold and silver, and many others.

The question which the case suggests is in regard to the manner in which the neutralization of the effect of the transmitted rays is brought about by the secondary rays and why it seems to be so complete in some cases and not in others. The writer has tried to ascertain whether the exposure of the plate to the transmitted rays and to the secondary rays must be simultaneous, but has been unable to produce the anomalous effect by successive exposures, that is, by an exposure first with the upper coin in place followed by another exposure with this coin removed and the lower coin in place. No vestige of cancellation could be found.

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THE ACID SPOTTING OF MORNING GLORIES BY CITY RAIN

That the trees, shrubs and flowering plants in our large cities and in the country along our trunk-line railroads are subjected to conditions which cause unhealthy growth and disease has been proven abundantly. Large factories, power plants and railroad locomotives are pouring out volumes of smoke, which alone is highly injurious, but in addition the acid which is formed in the combustion of coal, when dissolved in rain water, has injurious effect upon foliage and other plant parts. Its action is seen in the corrosion of tin roofs, rain pipes and ornamental iron work about city houses.

The following note is of interest to the plant pathologist and plant physiologist. During the night of September 19, 1913, a light rain fell, followed by a fine drizzle in the early morning of September 20. The wide-open campanulate flowers of the common morning glory (*Ipomœa purpurea* Roth), growing on a lot in West Philadelphia, four or five blocks from the Pennsylvania Railroad, had their usual quota of raindrops studded over the upper, inner surface of the purple corollas. Wherever the drops touched the surface of the corolla, the purple color was changed to a pinkish red, and in the process of evaporation of the raindrops the acid of the drops was concentrated, so that after the complete disappearance of the drops a brown spot was left in the center of the pinkish red circles of discoloration. The explanation of the alteration of color is found in the change of the sap of the corolla cells, where touched by the acid raindrops, from an alkaline to an acid reaction. A similar change can be induced in blue violet petals by bruising them slightly and placing them in an acid liquid. The petals change, like blue alkaline litmus paper, from blue to red, and this reaction with violet petals has proved useful in the physiologic laboratory in the absence of litmus paper. In nature a reverse change, which illustrates the same chemic principle, takes place in many flowers of plants belonging to the family Borraginaceæ. For example, in *Symphytum* and *Mertensia*, the red flower buds, the cells of which have an acid cell sap, gradually change to blue as the flowers open. That this is a chemic change is proved by treating the red buds with an alkaline fluid and the blue flowers with an acid one.

Similar spotting, but less clearly discernible and demonstrable, as the delicate reaction with morning-glory flowers, undoubtedly occurs on leaves and fruits, and the suggestion is made here, that such spots caused by the acidity of raindrops serve repeatedly as the points of entry of parasitic fungi, for there are many leaf spots and fruit spots that show concentric rings of diseased tissue in the earliest lesions produced. A fungus, which is stimulated to growth by an acid condition of the cell sap, would find ideal conditions for the commencement of growth by entering areas influenced by acid raindrops.

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SCIENTIFIC BOOKS

The Genus Iris. By William Rikatson Dykes. With forty-seven colored drawings by F. H. Round, one colored plate of seeds by Miss R. M. Cardew and thirty line drawings by C. W. Johnson. Cambridge, at the University Press. The University of Chicago Press, Chicago, Ill. 1913. Demy Folio. Pp. viii + 246. Price £6, 6s. net.

Thirty-six years ago J. G. Baker published his "Systema Iridacearum" in the *Journal of the Linnean Society*, including a revision of all the genera of the family. In this paper the genus *Iris* was made to include 81 species, distributed among six "sub-genera," namely, *Apogon* (33 sp.), *Onocyclus* (5 sp.), *Evansia*