THE question as to what is the real cause of the illusive effect of atmosphere in modern landscape painting has been answered in various ways by different writers; but the answers are not satisfactory because they do not give any clear demonstration of the explanations offered. It has been demonstrated to be an absolute fact that the illusive atmospheric effect which is evident in the best of modern landscape paintings is wholly due to the law of simultaneous contrast of colors, first established many years ago by Chevreul, the noted French chemist.

It is generally known that two colors are complementary when their prismatic mixture will produce a white light. The artist can readily prove this with the naked eye, and without the use of scientific apparatus. Every color has its complement, it does not matter whether it be pure or broken, high or low in tone. If we look at any color for a few minutes, and then suddenly shift the vision to a white surface, we will see a pale tint of a color which is complementary to the color of the object looked at; and if we look at any color for a few minutes and then suddenly shift the vision to a colored surface, we will see the latter slightly changed in hue by the complement of the first color looked upon. So it is plainly evident then, that after we look upon any color for a very short time, the next object we look upon will be seen through the complementary tint or “after-image” of the color just looked at, and hence will at first glance be changed in hue by that complementary tint; but if the color and object be placed side by side, then this complementary influence will continue, otherwise it will vanish after a few seconds.

This apparent change in color is due to the peculiar action of light upon the retina of the eye. This action calls into existence in the eye a pale tint, which is always complementary to the color projected upon that part of the retina. The retina is a very delicate membrane lining the inside of the back part of the globe of the eye. This membrane is composed of thousands of cones or nerve ends, which unite into what is called the optic nerve, connecting the eye with the brain. The retina is said to be divided into different sets of nerves intermingled, each set being directly sensitive to one kind of light vibration (that is, one of the colors of which white light is composed). When a colored shape of any kind is projected upon the retina, the nerves within that shape which are directly sensitive to the light vibrations will quickly become fatigued, while all the other nerves within the same shape upon the retina (which represent the other colors of the spectrum,
ILLUSION OF ATMOSPHERE IN PAINTING

that in combination produce a color complementary to the color of the object looked upon) will become sympathetically excited to such an extent that the resulting complementary tint will apparently take the place in the eye of the color just looked upon; so that if the eyes are suddenly shifted to a white surface, this complementary tint will be seen, instead of the first color looked at.

This secondary effect is aptly termed an “after-image” by Von Bezold; and this “after-image” is always just the shape of the object looked upon, and becomes so strong in the eyes of some people as to cause confusion of the judgment as to the real color of some objects; and in some cases it almost completely neutralizes the first impression made upon the retina, especially by red or green. In such cases persons are said to be color-blind; but in healthy normal eyes this secondary effect merely causes an apparent dulling of a color when looked at persistently, without changing its hue.

When complementary colors of equal tone-value are commingled, then we get as a result a luminous atmospheric effect, due to simultaneous contrast.

By contrast is meant the effect produced upon each of two or more colors possessing different or opposite qualities, when they are compared, intermingled or placed in juxtaposition. The effect is always to emphasize the quality of an opposite tendency in each. So, the real reason for this illusive atmospheric effect is simply that a mixture takes place in the eye of the rays of light coming from different pigments which are complementary in color or nearly so, producing in the eye the sensation of white or colored light through which that part of the painting is really seen. Of course, this result is through vibration, the vibration of different rays of light impinging upon the sensitive nerves of the retina, which combined, results in a sensation of white or colored light.

When two colors are viewed one after the other, we get what is known as a successive contrast—in which the second color is influenced by the complementary tint (after-image) of the first color looked upon; for example, when red and blue are placed together and are viewed at close quarters, the red will appear to be more orange than it really is and the blue to be more green than it really is. But when red and blue are placed together and looked at from some distance, then we get what is known as a simultaneous contrast—a reciprocal action in which the complementaries of both colors are mixed in the eye, producing the effect or sensation of a colored light, through which is seen all the colors in that part of the painting.

The change then which apparently takes place in colors, when placed together, or when they are looked at in rapid succession, is
due to the fact that we really see one color through the "after-image" (complementary tint) of some other color. When the eyes are first focused upon any color, the focus-point is never completely at rest upon any minute part of that color, but instead, plays with lightning-like rapidity here and there all over the color looked upon. In this rapid shifting of the focus-point of the eyes, the impression made upon the retina of the eye by one color will at times be partially or wholly overlapped by the impression made by the other color; the result is that when red and blue have been viewed at close quarters both have been successively impressed upon the same part of the retina; so that when the eyes are focused upon the red it is for the moment apparently seen through the complement of blue, and when the eyes are focused upon the blue it is for the moment apparently seen through the complement of the red; the result being, as stated before, that in the case of successive contrast the red will appear more orange than it really is, and the blue more green than it really is. But when these colors are viewed from a distance then we get a simultaneous contrast because both colors have been almost simultaneously impressed upon the same part of the retina, producing in the eyes a mixture of the complements of red and blue, resulting in the sensation of a colored light through which these colors are seen. This so-called simultaneous contrast is in fact a very rapidly continuous successive contrast.

Now, we will proceed to a simple demonstration of the truth of the claims made in this paper. Let the reader take a sheet of white paper and place upon it, about four inches apart, a spot of orange cadmium and a spot of medium cobalt blue.

Then place a black dot in the center of each spot and also a dot halfway between the two for the purpose of having fixed points upon which to focus the eyes. Now, allow the eyes to focus upon the dot on the orange for a minute and then look at the black dot between the two colors and there will be seen a pale blue tint of the color which is complementary to orange. Now, allow the eyes to rest upon the dot in the blue spot for a minute and then shift the vision to the dot between the two, and there will be seen a pale tint of orange which is complementary to the blue.

We will now allow the eyes to dwell for a few seconds upon the dot in the orange spot, then shift the eyes to the dot in the blue spot for a few seconds, then back again to the orange spot, repeating this "to and fro" action in a regular manner for a half minute—and then suddenly look upon the dot between the two and there will be seen a pure white spot, which is equivalent to a prismatic mixture of the complementary tints of orange and blue.
ILLUSION OF ATMOSPHERE IN PAINTING

Now try this experiment again and then immediately look upon some colored surface—and there will be seen a pale spot upon this surface, which is intangible, hazy and atmospheric in appearance. It is the same in effect as seeing the surface through a white fog (atmosphere) because the sensation of white has been produced upon the retina by the vibratory mixture of these complementary tints.

The mixture in the eye of the light coming from the colored pigments on a canvas takes place in the same manner except that the observer does not deliberately shift the vision from one spot of color to another, but instead, the focus-point of the eyes causes the mixture naturally, by a rapid play all over and across the different spots of color, and produces the sensation of white or colored light in the eye, through which atmospheric haze the landscape is seen, and hence, this mysterious atmospheric illusion.

When two or more pure colors which are complementary, or three or more which produce a complementary balance, are commingled, they will produce the sensation of white or colored light in the eye, causing the effect of luminosity. When broken or dark complementaries are commingled, they will produce the sensation of a low-toned white or gray light in the eye. When colors which are not complementary, are commingled, then they will produce the sensation of a colored light in the eye. For illustration, let the reader take a sheet of white paper and place upon it a spot of red (a mixture of vermilion and madder lake) and a spot of medium cobalt blue.

Then place a black dot in the center of each spot and also a dot between the two, for the purpose of having fixed points upon which to focus the eyes. Now allow the eyes to focus upon the red spot for a minute and then look at the dot between the two, and there will be seen a blue-green tint, the complement of the red. Now allow the eyes to rest upon the blue spot for a minute, and then look at the dot between the two and there will be seen an orange tint, the complement of the blue. Now, allow the eyes to rest upon the red spot for a few seconds, then shift the vision to the blue spot for a few seconds, then back again to the red spot, repeating this action for a half minute, and then suddenly look upon the dot between the two, and there will be seen a pale yellow light which is equivalent to a prismatic mixture of the complementary tints of the red and the blue. Now, if this experiment be repeated and the eyes are suddenly shifted to some colored surface, there will be seen a hazy atmospheric spot slightly tinged with yellow.

It should be evident to the reader that when red and blue dots of equal tone-value are intermingled on a canvas, that a similar mixture of their complementaries takes place in the eye when they
ILLUSSION OF ATMOSPHERE IN PAINTING

are viewed from a sufficient distance to produce the effect of a simul-
taneous contrast.

Monet and other "luminarists" have frequently failed to attain
a perfect atmospheric and luminous effect by the spot method, be-
cause some of the spots would be too strong in tone; notably the blue
or violet—entirely out of value with the other colors used to attain
the result desired. I have seen some paintings which were marred
by the fact that the dots used to produce light and atmosphere were
not of the same tone-value. The result being that the yellow dots
would vanish at about ten feet from the canvas; the red dots at about
fifteen feet; the blue dots at about twenty-five feet; and the violet dots
persisted clear to the opposite side of the gallery thirty-five feet away.

Now, suppose we wish to produce the effect of light and atmos-
phere in a sky by the commingling of different pigments upon the
canvas. We may use pairs of complementary tints like the orange
and blue, yellow and violet, or tints that are nearly complementary
like crimson and lemon yellow, red and cerulean blue, or orange and
cerulean blue, or we may use five or six different colors—red, orange,
yellow, blue, violet and crimson at the same time. It is of the utmost
importance that whatever number of tints are used should be so well
balanced—so equal in tone-value, that when commingled on the
canvas, they will occupy one atmospheric plane in the painting—
that is, will appear to be the same distance from the eye. When this
result is obtained then the different dots as individual colors will
vanish simultaneously at a certain distance from the painting and
the mixture in the eye of the rays of light coming from the different
pigments will be complete, and we will get as a result a luminous at-
mospheric effect. The color quality of this light can be controlled
by simply allowing one or more of the colors to predominate; that
is, if a blue tinted sky is desired, then show more of the blue than
the other colors.

Any color can be made atmospheric and luminous by having small
spots or touches of its complementary scattered or broken all through
it. If it is desired to represent distant objects, earth, grass or foliagen
then, of course, the complementary touches must be sufficiently gray
to keep the proper distance from the eye. This art of commingling
colors which are more or less complementary, for the purpose of pro-
ducing the illusion of light and atmosphere, can be applied to the
darkest of night effects as well as to the brilliance of day. The lumi-
nous and atmospheric darks of night can be produced upon canvas,
through the same law of simultaneous contrast, by the commingling
of very dark colors which are more or less complementary.