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THE SCIENTIFIC MONTHLY

DECEMBER, 1918

CAMOUFLAGE

By ABBOTT H. THAYER

MONADNOCK, N. H.

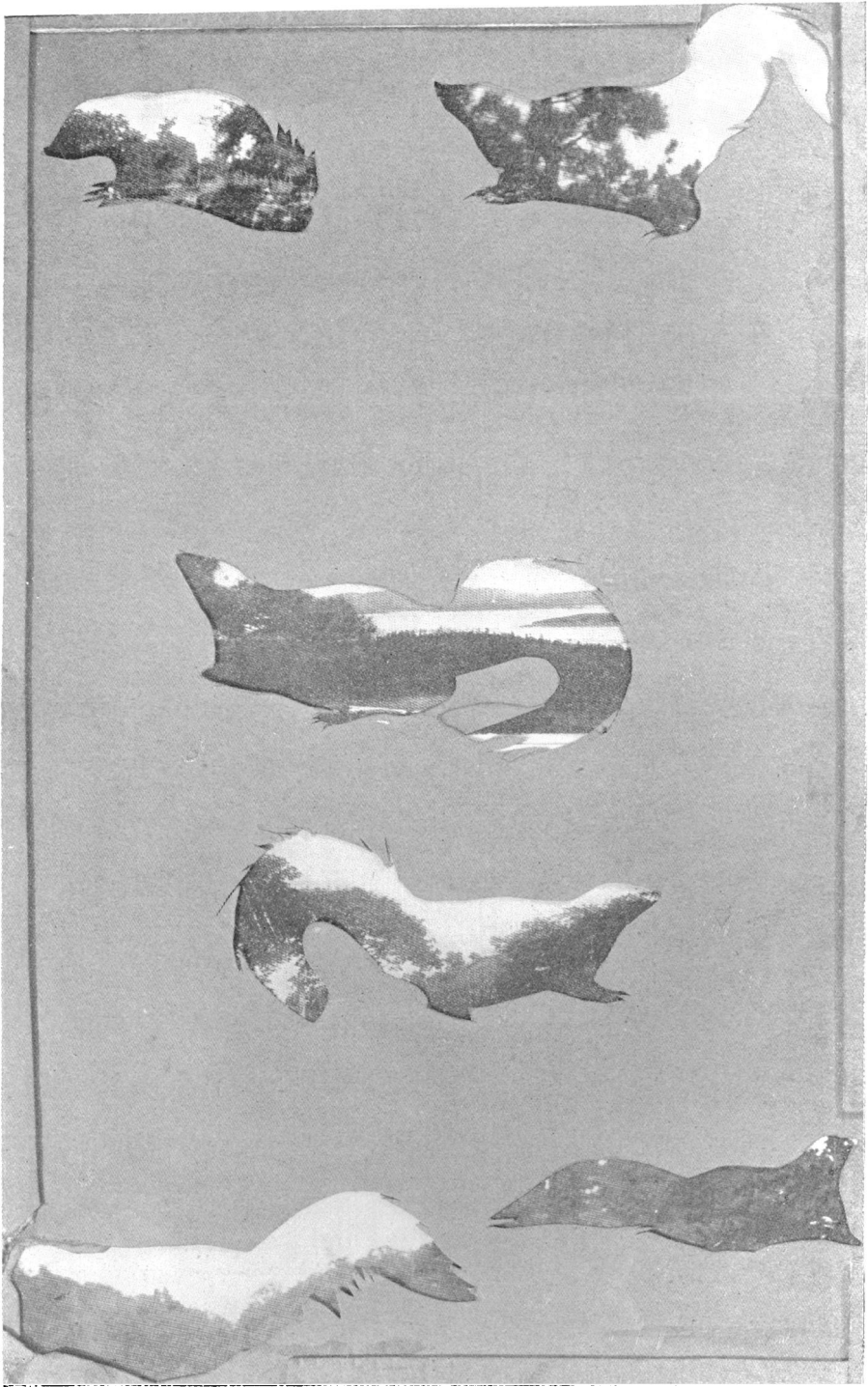
ABORIGINES in general have used camouflage in their war costume.

In their superhuman perfection, the concealing coats of animals that hunt or are hunted are now the models for the armies' camouflage corps: models so perfectly adapted to concealment in every conceivable scene, they are the despair of humanity. To study the principles underlying them, and to adapt them to the needs of the army, is now man's job.

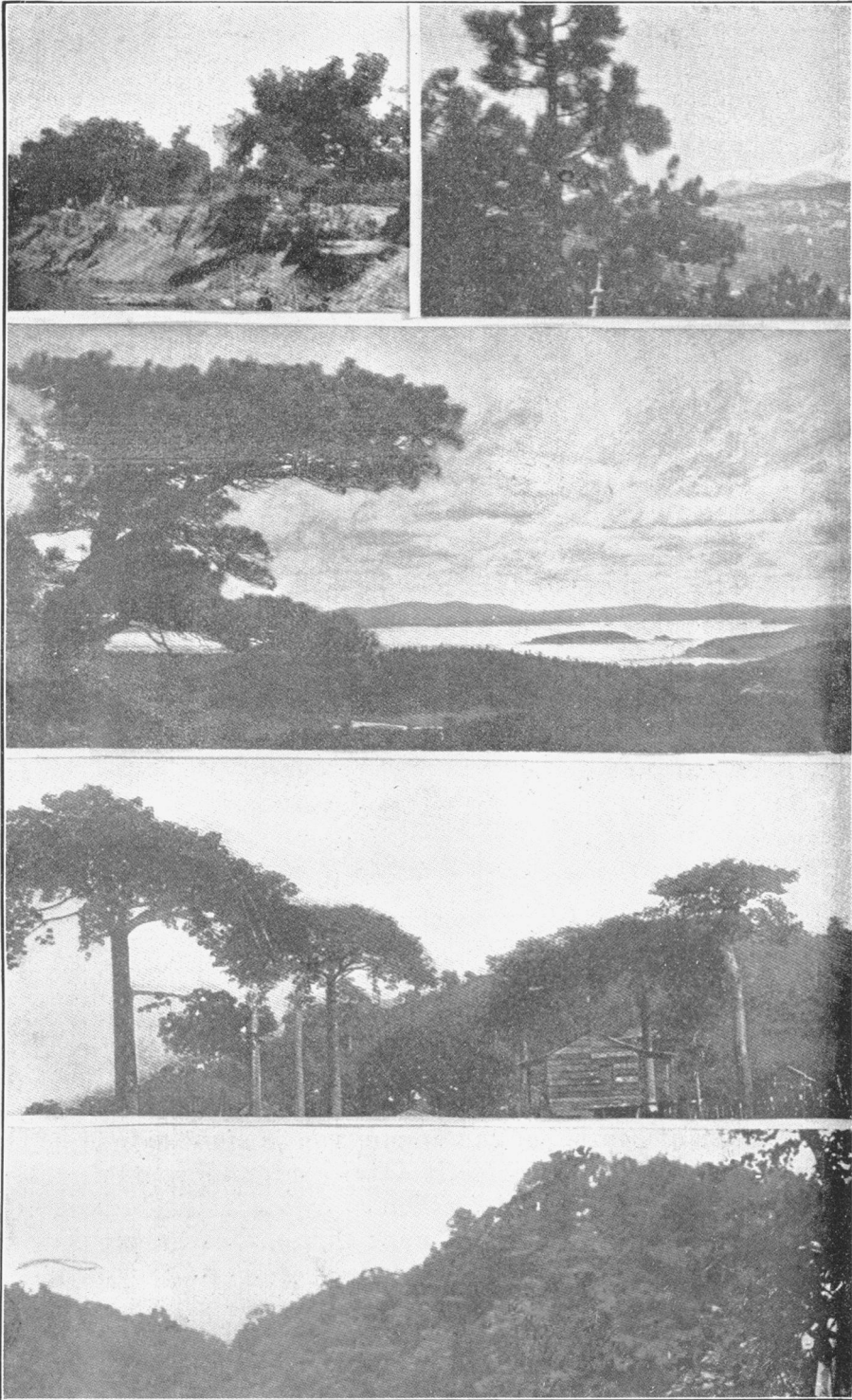
The most totally effacing costume can not be counted on to prevent its wearer's being detected when he moves enough; but even in this case it makes him a poorer target when it comes to dodging, whether it be man or beast. The white sky-faking tail feathers of warblers serve to help save these birds when pursued through the woods by hawks, where the swiftness of the chase sets all the background optically into the same motion.

Whatever question there is as to the need of animals to be concealed, as to the evolution of the patterns on them, and the purpose of these patterns, one fact in regard to the costumes of animals is demonstrable, *i. e.*, that these conceal their wearer most of all from the viewpoint of the very eyes that we believe this wearer most needs to avoid: in some the greatest need is to be enabled to catch, in others it is to escape being caught. In the one case, the skunk's or badger's white top, faking the sky, effaces their looming heads from the sight of the field mice and ground insects they are hunting; in the other case, the same black and white scheme saves on the same principle the zebra from the crouching feline.

It is a comment on the use that men make of their eyes, that with all the various uses, utilitarian, scientific and esthetic, a principle, *always in evidence*, the principle that patterns *al-*



LANDSCAPES PHOTOGRAPHED THROUGH STENCILS OF SKUNKS TO SHOW THE PROTECTIVE COLORATION OF THE WHITE SKY COUNTERFEITS.



THE LANDSCAPES PHOTOGRAPHED THROUGH THE STENCILS OF THE SKUNKS.



THROUGH A STENCIL.

ways inevitably tend to conceal, has waited till now to be discovered.

Two main oversights have caused the whole misconception as to the concealing effect of pattern on animals: one, the failing to study an animal's markings *from the viewpoint*, always, as a matter of course, *of the animal whose sight was to be deceived*; the other, the perfectly fatal confounding of *detection* with *identification after detection*.

Any pattern having color notes that are conspicuous from man's point of view insists upon recording itself upon men's minds, and has come to be considered as intrinsically conspicuous. Take, for instance, the part a skunk may play in our minds. We probably detect him oftenest by noticing a white patch going about at twilight in perhaps the neighboring field as we look down on it from our piazza. For this reason this

little beast has been set down, without further investigation, as conspicuous; while the case really is that nature has colored him for concealment from the small creatures on which he feeds, and above which he looms against the sky. (One would guess that because this white patch is so easily seen by hawks overhead nature has given him other means for his *own* protection.)

Exactly contrary to the conceptions of Darwin and his followers, pattern conceals its wearer everywhere against all backgrounds in direct ratio to its strength, *i. e.*, the degree of difference between the notes that compose it.

Monochrome, no matter how gray, *reveals* its wearer against all backgrounds whatsoever (and most of all if these are monochrome) except a background which is an absolute repetition of itself. (Of course it is the practically universal counter-shading of the world's animal life that alone could give it a monochrome aspect, changing the look of solidity to that of a flat surface.) Anybody will see at a glance that a monochrome area in the scene, having the shape of man, horse or bird, will



THROUGH A STENCIL.

catch the eye whenever it does not *absolutely match its background*, whereas, if the countless details of the scene recurred in the form of patterns right across this man-, horse- or bird-form, this form would be buried under this counterfeit of the scene.

On the other hand, the most monochrome of backgrounds opposes no difficulty to the concealing effect of pattern on an object seen against it, because some one of the colors of the pattern is almost sure more nearly to match the background than the other colors of it, and consequently *it* will seem to belong to the *background* rather than to the *object*.

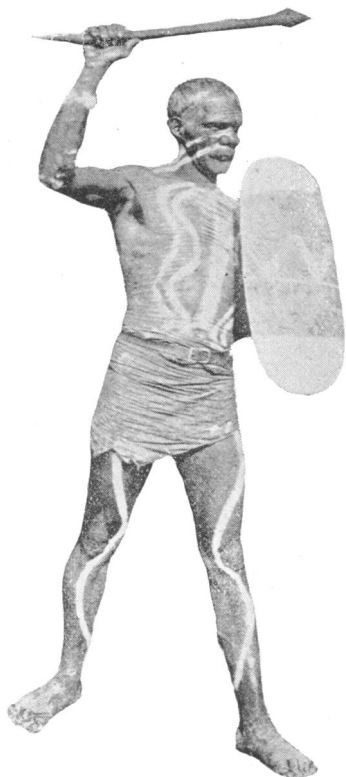


A BROOK SCENE PHOTOGRAPHED THROUGH A DUCK-SHAPED STENCIL.

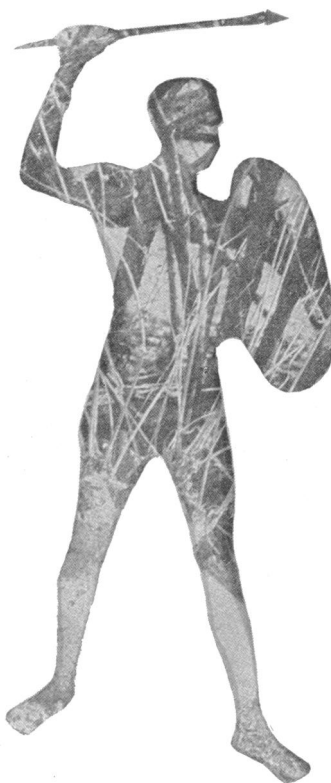
In cases where the colors of the pattern are all of them characteristic of the region, the deceptive imitation of the background is overwhelming; yet this resultant background-imitation is practically the universal accomplishment of animals' patterns. I have been left alone in the world to point this out; yet this whole fact is simply the ABC of all painter craft. Every painter in the world could have told you all about it the



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A KALINGA WARRIOR.



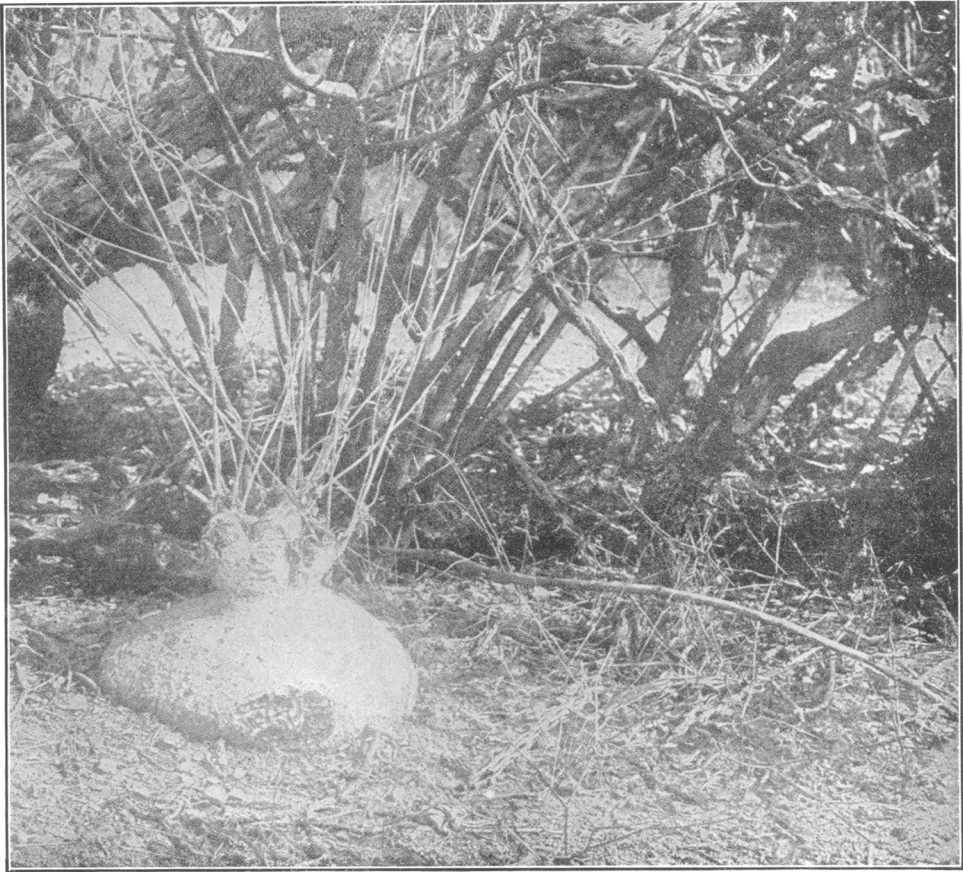
TATTOOED WARRIOR.
Kindness of the University Society.



SCENE PHOTOGRAPHED THROUGH THE
STENCIL OF A WARRIOR.

moment you asked him. In short *every* part of the naturalist's belief on this subject has been *antipodally* wrong, and just for want of asking sight-specialists' (*i. e.*, painters') aid about matters of sight.

Here is the whole indisputable fact in a nut-shell. As all painters know, two or more patterns on *one* thing tend to pass for so many separate things. All art schools will tell you that it takes a far-advanced pupil to be able to represent the *patterns* on any decorated object so true in degree of light and darkness as not to "cut to pieces" the object itself, and destroy its reality. Objects show or don't show by silhouetting dark or light or of a different color against a more distant thing—a stick against the ground, a tree against the sky. Among the million details that constitute out-door nature, every smallest detail is only distinguishable by becoming to the spectator a pattern against its background. Consequently when nature paints with marvelous accuracy on some animal a picture of a twig and the ground, the mind inevitably accepts it as twig and



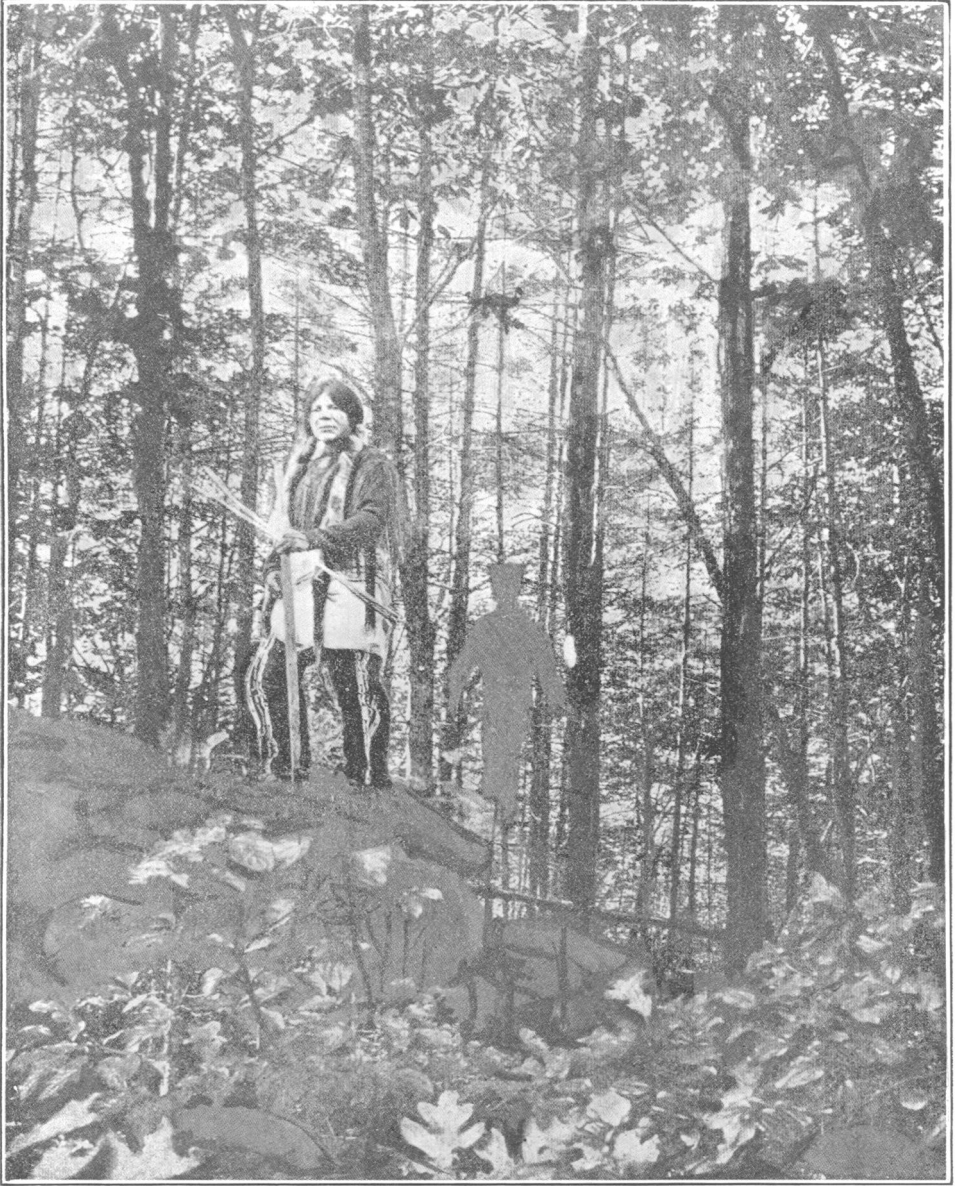
THE SCENE PHOTOGRAPHED THROUGH THE STENCIL OF THE WARRIOR.

ground. Could nature any further conceal an inhabitant of this scene than by painting superhumanly perfect *copies* of these objects on each inhabitant?

All the patterns and brilliant colors on the animal kingdom, instead of making their wearers conspicuous, are, on the contrary, *pure concealing coloration*, being the *actual color notes of the scene in which the wearer lives*, so that he really is nature's utmost *picture* of his background.

All colors and designs on animals *are pure art*, taking the lead, in the purity of their generalizations, of all human performance. Each bird's or beast's costume is pure scenery.

To discover what scene a bird represents, in cases where one plumage lasts all the year, consider what circumstances cause him the greatest need of protection, and you will commonly discover that he is *colored in representation* of such part of the scene, and such phase of it as the eyes that he most needs to avoid would see him against.



PATTERNED INDIAN AND MONOCHROME FIGURE. The Monochrome Figure may be the more distinguishable.



ARTIFICIAL ZEBRA AND ASS FROM VIEWPOINT OF A NEAR-BY STALKING LION, VIZ., A
LOWER LEVEL. The Zebra concealed; the Ass revealed.

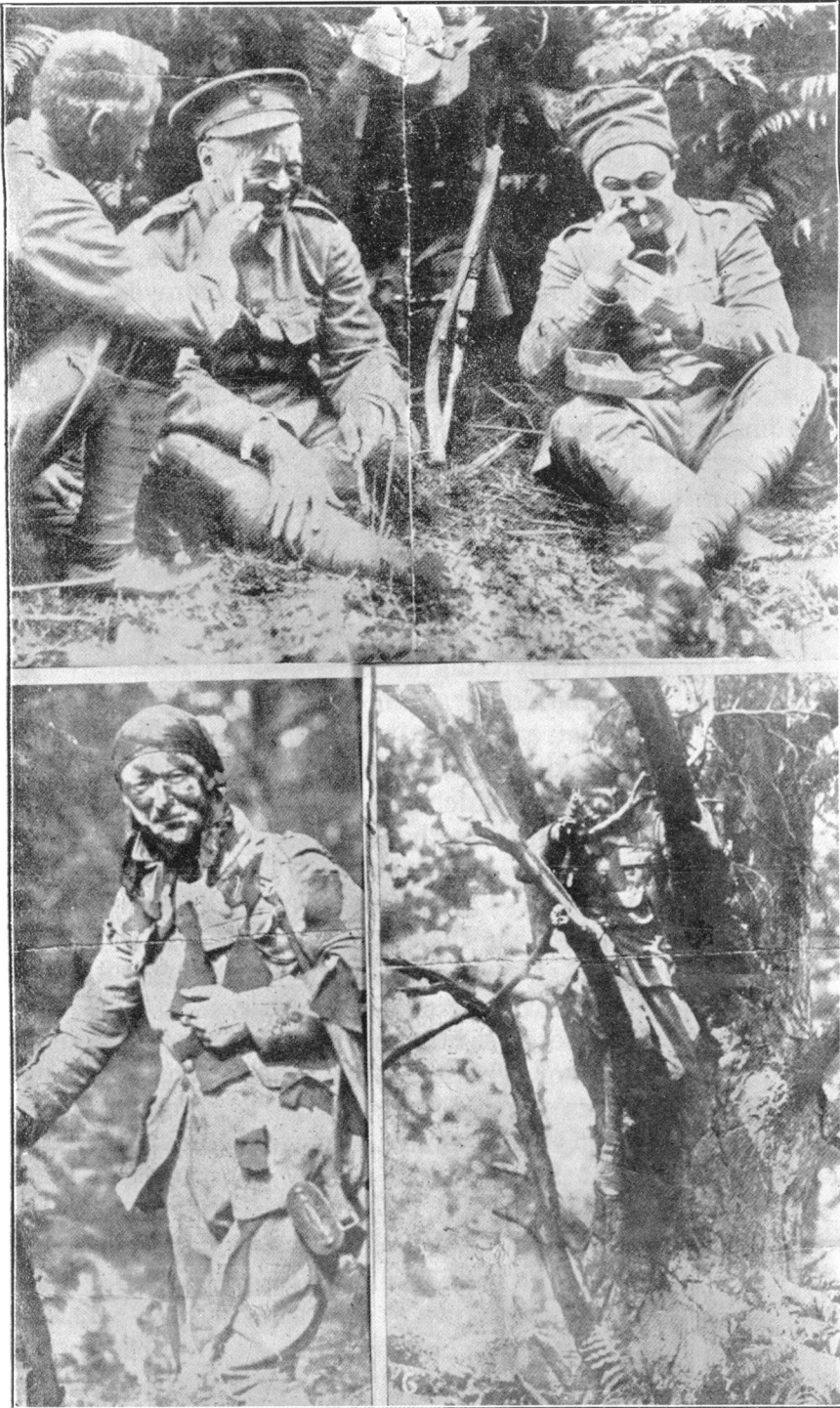
Naturalists will learn to know an animal's haunts and habits by his colors and patterns, which are nature's *utmost concealing coloration*, inasmuch as every color-coalition of any part of an animal with his background, or any presentation of the same color-note as that of any part of his background, inclines the beholder to think that he *sees background*, when he is really seeing a part of the animal. Even the scarlet bodice of the scarlet tanager by being a perfectly unbird-shaped scarlet patch amidst the forest foliage comes essentially into the same general classification because of the sprinkling throughout the forest of single scarlet leaves.

Go to the sedgy border of any water that best represents the type of place (*i. e.*, fairly level country) where antelopes, zebras, etc., would come to drink, and with your eyes a foot from the ground (crouching lions' eyes height) study through an antelope-shaped hole in a card the sky and reed-tops where they meet all about, and which would form these beasts' background to a crouching feline. What you discover is that the antelope's head-patterns example a universal costume-law, viz., those color-notes which are almost always present in the lion's view of the antelope, are fully repeated on the part of him this enemy is surest to see against such color-notes of the background. These head-patterns do the best that can be done to keep the antelopes' heads from silhouetting against the sky. They *fake* branches or reeds against the sky.

Go into the woods and in the comparatively open under-woods examine the realm between you and the sky through a similarly cut-out wood-warbler-shaped hole, and do the same to the bushes that surround your path *below* your level, etc. In this way ask the *ground* how the woodcock needs to look to escape an overhead hawk; ditto, ask how a low bush warbler; ditto, how a high tree warbler seen diagonally *above* the level of the accipiter. Remember that every bird or beast or insect picture thus made by looking at the background through that bird-, beast- or insect-shaped hole constitutes the asking nature what aspect would in that particular case totally efface such a creature in this exact situation when seen from just this viewpoint.

Next, one has only to try this on places enough to satisfy himself that he has the average. Always he will find that the costume of the species in question has every token of being *that average costume*.

An animal thus costumed tends to picture, wherever he is



From the *London Sketch*.

CAMOUFLAGE MAKE-UP. A Camouflage Scout and the same concealed in a tree.

seen from *average positions*, an average and most expectable type of scene. This morsel has very little need to fit very perfectly the surroundings it chances in any particular case to have. It merely says to the beholder, "Here is a bit of the sunny type of scenery that you know so well in this region when you direct your sight at this angle."

Looking through stencils more or less *upward* at the sky and branches will give us herons, jays, nuthatches, chickadees, etc. Looking through them more or less downward at the forest shrubbery over which the forest hawk commonly flies will give you the more or less ground-faking sparrows, etc., and such low bush foliage-faking warblers as lack the white sky counterfeit-patterns, such as the Maryland yellow throat and Canada warblers. Looking through stencils downward at the ground itself will give you ground-faking species, grouse, snipes, whippoorwills, etc.

See if you can make the stencil out-of-doors anywhere represent a flamingo save by looking at the dawn or evening sky over the lagoon, in which they are wading and against which their water enemies inevitably see them, or by looking at the water (reflecting these skies) against which the eagle would see these birds. See if you can make it represent *any* white-top-patterned species by looking at *dry* ground, or by looking in any direction save the one in which the avoided eyes would easiest detect a monochrome creature that did not absolutely match its background.

You can (any one can) look over all scenes through stencils, knowing that in every case the result is God's last word as to what costume would *there*, from that viewpoint, efface its wearer.

This being the case, man has only to cut out a stencil of the soldier, ship, cannon or whatever figure he wishes to conceal, and look through this stencil from the viewpoint under consideration, to learn just what costume from that viewpoint would most tend to conceal this figure.