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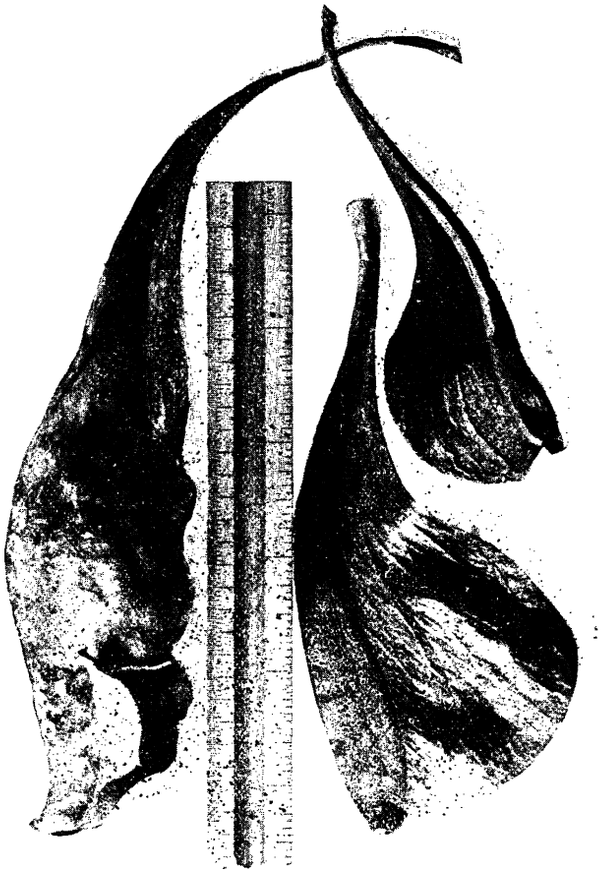
Attention is called to the "Wants" column. It is invaluable to those who use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The "Exchange" column is likewise open.

THE PRODUCT OF A CHANGED ENVIRONMENT.

BY GEORGE H. HUDSON, STATE NORMAL AND TRAINING SCHOOL, PLATTSBURGH, N. Y.

TOWARD the latter part of September or early in October 1891, a number of pitcher plants (*Sarracenia purpurea*, L) were sent to me from Wolf Pond, Franklin Co., N. Y., together with other bog plants, for our school Wardian case. This case is 120 cm. long, 51 cm. wide, 45 cm. deep, and stands before an east window where it does not get very much light, save on sunny mornings. We keep in this case many kinds of mosses, ferns, some fungi, and several small animals such as salamanders, toads, wood-frogs, young alligators, and different insect larvæ. This case also furnishes abundant material for microscopic study, such as rhizopods, infusorians, rotifers, etc. The pitcher plants were carefully set out in the east side of the case, and for several months the pitchers were kept filled with water, and were occasionally fed with flies and bits of meat. Later in the season the plants were neglected; the pitchers were not filled with water, nor was any kind of animal food given them. In the late spring there were two plants living. These plants had begun to increase the width of the leaf-like margin of their pitchers while the hoods and tubes themselves were suffering a marked change. These changes were intensified during the summer, and the result is shown by the reproduction of a photograph taken Nov. 5, 1892. This photograph shows an old and somewhat decayed phyllodium from one of the two plants, and, in contrast with it, one of the new phyllodia from each. These new phyllodia are bright green, without a trace of the usual coloring, serving to attract insects, save on the very edge of the aborted and flattened hood, where a faint border about 2 mm. deep may be noticed. Some of these hoods have not opened; the hairs which line others are in an immature and useless condition. The leaf-like margins of these curiously modified petioles, instead of being from one-fourth to one-third the width of the tube as in normal specimens, have become from three to four times the width of the now weak and flattened tube. The scale photographed with these phyllodia will show the extent of this modification. The scale shows inches on the left and centimetres on the right. Of the next older phyllodia the larger hoods have decayed, while the tube and its wing-like expansion are still in a healthy condition. This pitcher plant grows wild in Plattsburgh, and I have seen it in many places in the Adirondack region, but I have never noticed such wide margins in a state of nature. Was the change in our Wardian case made because of the absence of animal food, which made it necessary for the plant to look in other directions for its support? Was it made because of the absence of the influence of water in its tubes while it was forming these new phyllodia? Was the plant obliged to sacrifice its pitchers in order to extend its chlorophyl-bearing surface on account of the loss of light? The changes made, it will be noticed, were just those changes which would best bring it into harmony with its changed environment. Was this change made in response to the demands of the new environment, or were the changes but the reversion to an ancient type consequent simply on the diminished vitality of the plant? This curious change suggests many experiments which might easily be made to determine the extent to which certain lower organisms could vary in response to external stimuli, and thus be able to adapt themselves to unusual conditions in a changed or changing environment.

Early in the winter one of the little toads used to get into a large prostrate phyllodium, apparently to take a bath. We have noticed him a number of times sitting just within the hood with



his body partly in the water. The red, spotted salamanders crawl over the alligator and share the sunny portions of the case with him. Believing these bright-colored beings not fit for food, he has offered the little things no violence. One of the small garden toads did not fare so well but became a victim of a pair of jaws that broke his bones in their embrace.

LETTERS TO THE EDITOR.

**** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

Variation in Native Ferns.

THE wide variation in the forms of British ferns is well known to all who read the works of English florists, but there is less of this in America. Scolopendrium vulgare will have different auricles at the base, and sometimes is forked at the apex, but it varies little beyond this. I have found Woodsia ilvensis also with a forked apex, but this rare.

Aspidium acrostichoides is much more variable in many ways. Almost any woodland will present differing forms, as regards

scales, form of frond, and division of pinnæ. Several times I have found fronds clearly pinnatifid in the lower part. This might be called an extreme form of the variety *Incisum*, and is most likely to occur late in the season, and in rich woods undergoing the process of clearing. The pinnæ are also sometimes once or twice forked at the apex, and there are other changes from the normal form.

Camptosorus rhizophyllus is less variable, but the basal auricles will sometimes be prolonged much like the apex, and will root like that. Specimens have thus been found giving origin to three young plants. I have one frond which is pinnate, but with a normal frond from the same root.

The Osmundas vary much. O. regalis has often a few sporangia on the otherwise sterile pinnæ, and O. Claytoniana has sometimes the same feature. I have a curious series of O. cinnamomea, where the so-called variety Frondosa is fertile at the base and apex, at the base alone, at the apex alone, or only in the centre. There are other oddities in this fern.

The Botrychiums vary much. The variations of B. virginianum are well known, and the variety *Gracile* is quite persistent in some places. B. matricariæfolium varies from age and location, but I have found many distinct and beautiful varieties of B. ternatum growing luxuriantly together. In one abundant plantation of B. simplex there are many strange forms, not altogether due to age. This is in sphagnum, and not far off I have found it growing in water.

The variation of Cystopteris fragilis is a never-failing perplexity to some. It seems so different, and yet so familiar. Often it has been mistaken for Woodsia obtusa.

Some ferns which I collected in Colorado were interesting to Professor Underwood from their local variation in a broad sense, being near the limits of their district. I collected Aspidium septentrionale on Cheyenne Mountain, but it was immature, yet those of the preceding year were smaller and quite unlike those I had from Europe.

On Skaneateles Lake, N.Y., I found small patches of Pellæa gracile growing on wet rocks; in one place, almost in the bed of a small waterfall. In other places there I found it on dry ledges, the roots and tufted fronds forming a dense mat. The station made quite a difference in the appearance.

W. M. BEAUCHAMP.

Baldwinsville, N.Y., April 14.

Singing of Birds.

IN answer to E. B. Titchener's inquiry regarding the relation of song to emotion in birds, the following is offered by one who has made careful observations in the language of over fifty well-known species.

That there is an expression of feeling in the notes of all of our birds no true lover of our feathered friends will attempt to deny. We are all most willing to admit the existence of a bond between them and us, and this relation, or assumption perhaps, we would not care to have dispelled. Nevertheless, although I am so anxious to invest these creatures, "favorites of creation," as Figuier so fondly calls them, with higher attributes of feeling and expression, it remains a fact, that their notes do not change in quality as a result of change in emotion. At least, this is so in so far as our ears are able to distinguish. Let us consider some cases.

A pair of robins will make a great outcry if their nest is molested, the excited notes of the male corresponding exactly to his cries when engaged in his vernal battles, or, later, when giving excited warning to its defenceless young when a marauding cat is at hand. If the eggs are taken, the pair quickly subsides, and the male will probably be singing the same evening; surely the next morning. Within a very few days a new nest is begun in the same neighborhood, the song continuing daily.

I have carefully noted the song of the warbling vireo, which is one of the few birds which sing while sitting upon its eggs. In one instance, after the set of four eggs was removed, the bird remaining near by, and uttering its querulous notes, I waited to observe. The male quickly returned to the empty nest, which it had recently left, and at once gushed forth in song. It may be that the song expressed much sorrow, or at least a complaint, but to me it was the same inspiring, ecstatic warble that I was accustomed to hear. I have robbed the nest of the scarlet tanager, rose-breasted grosbeak, wood thrush, hermit, and indigo bird, all beautiful singers, and then waited and listened, allowing ample time for the male to learn of the spoliation. In each instance the male quickly tuned up, and, to my idea, sang as sweetly as ever.

The expression of sentiment, or whatever we wish to call it, in the harsh *caw* of the common crow, or the single *cruk* of the raven, may mean as much, and probably does, as the tinkling melody issuing from the elfin winter wren. Then, too, the ever mournful, lonesome song of the wood pewee, or the solemn-sounding *hoo-hoo* of the great-horned owl, or the weird monotony of the whip-poor-will, undoubtedly answer the purpose equally with the sprightly notes of our little friend, the melodious, jingling song-sparrow. However, these notes and songs, although they may mean much to the birds, are, to our obtuse ears, ever the same.

MORRIS GIBBS, M.D.

Kalamazoo, Mich.

On a Supposed Climatic Variation in the Wing-Color of some Orthoptera.

I HAVE read with much interest the communication of Mr. Lawrence Bruner (p. 133) on the supposition that climatic differences may account for the different coloration — yellow, orange, red, blue — of the wings in some North American locusts, and, as the author requests other opinions, I will relate my experience in the Transvaal, where I made a considerable collection of orthoptera in the neighborhood of Pretoria.

Pretoria stands on the high table-land of the Transvaal; an almost treeless region, consisting of vast grassy plains well known by the name of "veld," with occasional hills or ranges of low mountains. In the dry winter season these plains are merely covered with a brown withered herbage; after the summer rains they are clothed with a more or less luxuriant crop of grasses and other plants. Consequently the conditions are very uniform throughout the area, but as I collected in the immediate neighborhood of the town of Pretoria, and during the summer season of 1890–91, the conditions of soil, climate, and altitude were absolutely identical.

My collection of orthoptera made at that time[1] affords evidence against the conclusions of Mr. Bruner, respecting the North American species, as the following list of some of my captures — a few conspicuous species — will show.

Species with orange-colored wings:—
Parga gracilis Burm.
Phymateus leprosus Fabr.

Species with yellow-colored wings:—
Catantops sulphureus Walk.
Oedaleus citrinus Sauss.
Oedaleus tenuicornis Schaur.

Species with red-colored wings:—
Phymateus squarrosus Linn.
Phymateus morbillosus Linn.
Zonocerus elegans Thurb.
Laphronota porosa Stål.
Acridium rubellum Serv.

Species with blue-colored wings:—
Oedaleus acutangulus Stål.

It will be observed that the same genera show different coloration, as *Phymateus*, orange and red; *Oedaleus*, yellow and blue.

The philosophical conception of the origin of these bright colors is very difficult. Of course they are purely non protective, as species thus ornamented are most conspicuous objects when on flight; and even on the ground or elsewhere, where their folded wings and sombre or greenish hues assimilate them to their surroundings, they are easily found and greedily devoured by most birds. I found their remains in the crops of many birds. Even

[1] A complete list is given in the Natural History Appendix to my "Naturalist in the Transvaal."