a very severe pruning. When growth began in the spring there were no leaves to produce active transpiration, and but few growing points to accommodate the excess of water which the large root system was continually pumping up. The excess of water in the phellogen layer was drawn into the interior of the cell protoplasm by the vegetable acids, and since it could not filter out readily, nor be removed sufficiently fast by transpiration, the cells were abnormally stretched and at last collapsed.

Similar troubles have been recorded as appearing on other plants, as potatoes,[2] grapes,[3] rose and plum seedlings, gooseberries, beans[4] and pears[5]; and recently Halsted has recorded it on pelargoniums.[6]

THE SPEECH OF ANIMALS.

BY HOWARD N. LYON, M. D., CHICAGO.

THAT animals have a means of communication among themselves through certain vocal sounds is a well established fact; that these vocal sounds are of sufficient range to express other than mere physical ideas, and thus to assume the importance of a language, is probable, although as yet unproven. It is towards the final settlement of this question that I wish to add my mite, and, while there is much that might be said, in the present instance I will confine my observations to a field but little explored—the attempts of animals to communicate with man.

For the last three years I have had a tame fox squirrel of which I have made a great pet. Polly has occupied a cage in the laboratory where she has been, for the most part, shut off from the sights and sounds of the outside world. Although at times the laboratory has had other tenants in the shape of squirrels, rabbits and guinea-pigs, she has formed no particular attachment for any of them, but when I am about she is usually close to me, either on my shoulder or following me about like a dog.

Unconsciously at first and later with a definite purpose I have talked to her much as one would talk to a young child. About a year ago she began to reply to my conversation. At first it was only in response to my questions as to food, etc., but later her *"talk"* has assumed larger proportions until now she will, of her own accord, assume the initiative.

Her vocabulary appears to be quite extensive, and while, for the most part, it pertains to matters of food and personal comfort, there are times when it seems as though she were trying to tell me of other things.

When I first go out where she is in the morning she immediately asks for food, and until that want is supplied she keeps up a constant muttering. Later when her hunger is appeased she will ask to be let out of the cage. Often when playing about the room she will climb onto my shoulder and *"talk"* to me for awhile in a low tone and then scamper off. Unless she is sleepy she will always reply to any remark made to her.

Her speech is not the chattering ordinarily observed in squirrels, but a low gutteral tone that reminds one both of the low notes of a frog and the cluck of a chicken. Some of the notes I have been able to repeat, and invariably she becomes alert and replies to them. Unfortunately, the effort to reproduce her tones produces an uncomfortable effect on my throat, and I have been obliged to desist from further experiments in that direction. The sounds that she makes are quick and in low tone, so the attempt to isolate words is very difficult, yet there is as much range of inflection as in German.

Another reason why I believe she is endeavoring to communicate with me is that she has used the same sounds towards other squirrels confined in the same cage, and that, while she will answer any one who addresses her, she voluntarily will only talk at length to me. That she understands what is said to her is beyond question, and, furthermore, she will distinguish between a remark made to her and one made to some one else.

I have had many pets that would answer in monosyllables to a question asked them or indicate by actions their desires, but this is the first instance that has come under my observation in which an animal has attempted more that that.

When Polly first commenced *"talking,"* I regarded it merely as idle chattering, but further observation shows that it is not such, and that the sounds she makes have a definite meaning. Moreover, the sounds she makes in *"talking"* are not the shrill notes of anger or alarm, but low, clear sounds that are unmistakably articulate.

In my fondness for my pet, have I overestimated the value of the sounds she makes, or am I right in assigning to them the characters of speech? Why should an animal not attempt to communicate with man? The higher animals are possessed of a well-formed larynx and vocal chords. Why, then, should we deny or ever question the possibility of articulate speech? And, if they can converse among themselves, why may they not attempt to communicate with man?

Anyone who has owned a well-bred dog can relate numerous instances in which his dog has clearly understood what was said to it, and the readiness with which a dog learns a new command shows an intelligence of a high order. Although a dog's vocabulary is of limited range, it has certain definite sounds that possess an unmistakable meaning. There is the short, sharp bark that expresses a want, the low, nervous bark that means discomfort, the sharp, quick bark of joy, the low whine of distress, the growl of distrust, the deep growl of anger, the loud bark of warning and the whimper of fright. When to these is added the various movements of the body, cowering in fear, crouching in anger, the stiff bracing of the body in defence, leaping in joy, and many special actions, as licking the hand of the master or pulling at his clothes, we find that a dog can express his likes and dislikes, his wants and his feeling as clearly as though he were human. Anyone who, in a time of sorrow or depression, has had his dog come to him and lay its head in his lap and has looked down into those great brown eyes so full of sympathy and love, can never doubt that the dog understood all, and in its own way was trying to comfort.

A friend's cat has an unmistakable sound for yes and no. The former is a low meyouw, while the latter is a short, sharp m'yoww. If Tom wants to go out that fact is made manifest by a quick meyouw'. If, perchance, anyone should be in the chair which Tom regards as his especial property, no regard for propriety restrains him from indicating that fact and unceremoniously ordering the instructor out. His me'youw' on such an occasion can not be mistaken. Instances of this sort are not uncommon and ordinarily fail to attract attention, but is there not here a field that will well repay a careful investigation?

Until my pet squirrel commenced her performances I regarded these things as a matter of course, but her chattering has raised with me the question, Is it not possible that our animal friends are endeavoring in their own way to talk to us as we talk to them?

[2] Ward, on some relations between host and parasite. Proceedings Royal Society, XLVII, 1890, p. 393-443.
[3] Gardener's Chronicle, 1878, I. 802, and 1889, I. 503.
[4] Sorauer, Wassersucht bei Ribes aureum, Freihoff's Deutsche Gartnerzeitung, Aug. 1880.
Pflanzenkrankheiten, Zweite Auflage, I. 235-238. Goeschke, Die Wassersucht der Ribes, Monatsschrift d. Verein z. Beford. d. Gartenbaues in den kgl. Staaten, October heft. 1880, 451.
[5] Quabius, Wassersucht bei Birnen, Jahresb. d. Schles. Centralverein's fur Gartner und Gartenfreunde zu Breslau, 1881.
[6] Bulletin Torrey Bot. Club, XX., 1893, 392.