

finally erect, as in the case of the willow catkin. He thought we might safely conclude from these facts that vegetation not only grew towards the light, but exercised at the same time a lifting force which we had not before recognized.

He believed no explanation had ever been given that was generally accepted as to the curving of many kinds of pine-cones. Possibly the facts now offered might furnish the key.

Mr. Meehan then exhibited some expanding buds of *Fraxinus quadrangulata*, and showed that they had *no bud-scales* as other species of ash had. These other species had two pairs, the outer broad and somewhat thin, and which underwent little change in spring; the other and inner often grew into a short succulent subtetiole. In the *F. quadrangulata*, at the termination of its full growth, instead of the usual broad scales, there were but minute black specks, which in the spring grew out into fully developed leaves. The buds of this species of ash were, therefore, "naked" buds. He had under his observation only one tree of this kind; but he took it for granted it was the usual condition of other trees of the species.

On his grounds were many hundred of *Fraxinus excelsior*, and he noted this season a large number of them, of which he exhibited specimens, that had the same characteristic buds as in the *F. quadrangulata*. Examining further, he found that in all cases of this kind the buds terminated second growths of last year. In all other cases, where the normal solitary cycle of growth was all that was made, the usual broad bud-scales were present. Thus we arrived at the important conclusion that a law which operated with sufficient uniformity in the case of *F. quadrangulata* to constitute a specific character, existed only in special cases in another species. What that law is, he thought yet unknown. To most persons it would be a sufficient answer to say, it was the *late second growth* which caused the non-development of true bud-scales in the case of the *F. excelsior*; but, remembering the case of *F. quadrangulata*, where the same facts existed without the second growth, we could only say that this circumstance merely aided the action of a law, which could operate without it.

He suggested that the science of botany had suffered from the too hasty assumption of explanation of facts. For instance, it was taught in our best text-books that the "office of bud-scales was to protect the tender parts beneath." It would strike any one at once that it ought to be as necessary for *F. quadrangulata* to have this protection as *F. excelsior*; but not only this, but here we have the fact of *F. excelsior* getting through the winter as well without as with them, and that, too, on the secondary, and as many would suppose more immature, growth.

MR. MEEHAN further referred to a paper which he contributed to the "Proceedings" of the Academy last fall, on the flowers of *Ambrosia artemisiaefolia*, in which he showed that the horns of the

[July 11