of its accessibility. The Paradise Glacier, known for its ice caves, was measured from three points rather than one because it has a broad cliff-like front rather than a snout as a terminus. So heavy was the snowfall of the past winter that when the measurements were made in September one point was still covered to a depth of several feet. Recession measurements have been made of the Mount Rainier ice fields for several years, but the records for the Nisqually Glacier date further back than any of the others. The total recession recorded for this ice field during the past 75 years amounts to 3,118 feet.

DISCUSSION

THE OLDEST KNOWN PLANT VIRUS DISEASE

THE virus diseases of plants and animals are each year attracting more attention. Modern medicine, on the one hand, and plant pathology, on the other, developed about the modern concepts of parasitism and "the germ theory of disease." Much in modern mycology and bacteriology developed in turn out of the stimulated studies of the specific parasites concerned. Naturally work with the grosser fungi antedated that with the more minute and hence more baffling bacteria. Finally the ultra-microscopic or filterable viruses were recognized, their study requiring still more refined techniques. With the aid of such, the youngest branch of biological science, "virology," is now being outlined. And just as earlier with bacteriology so now with "virology" the developments are led by those interested in the applications to pathology, whether with diseases of man, lower animal or plant.

For many purposes of experimental study, the plant offers peculiarly attractive host material for the investigator seeking fundamental information as to the nature or characteristics and distribution of viruses. This has recently been illustrated on the historical side by a publication[1] of scholarly merit and of broad interest to students of diseases of this obscure type. The authors are especially competent to find and evaluate the evidence, Professor McKay having for years been a leading investigator of virus diseases in the Pacific Coastal regions and Dr. Warner being bibliographer of the United States Department of Agriculture. Professor McKay recently demonstrated that the so-called "breaking" of tulips, which is evidenced by curiously streaked, speckled or feathered coloration of flowers with fainter foliage mottlings, is really a "degeneration" or "mosaic" disease. It is caused by an infectious virus which is readily transmitted with infected juice, either mechanically or by aphids. Once infected, the condition persists with the bulb. Hence, new "bizarre" color strains originate which have heretofore been considered "variegations" by bulb growers and so propagated and commercially distributed.

[1] "Historical Sketch of Tulip Mosaic or 'Breaking,' the Oldest Known Plant Virus Disease," by M. B. McKay and M. F. Warner, *National Horticultural Magazine*, 12: 179–216, July, 1933.

Of much immediate interest is the fact that these floral markings are so distinctive as to permit their recognition in the earlier illustrated floral catalogues and even the early herbals. The authors not only list these, with full bibliography, but reproduce the early plates from several such herbals as Clusius (1576), and from the illustrated garden manuals of Vallet (1608), de Bry (1612), etc. Moreover, some of these writers record observations upon the origin of their "broken" strains from those of pure color, exactly as now is experimentally reproducible. Clusius, in addition, notes that offsets from "broken" bulbs always have flowers of the same broken colors, whereas seedlings from the same plants reproduce the original pure color strain. The authors trace the early records of the introduction of the tulip into the gardens of western Europe from Turkey and show not only that such "breaking" was common among these earliest Turkish introductions, but also that it was probably observed by 1555 or earlier in the Turkish gardens before the bulbs were carried from these to western Europe. Thus, the evidence seems clear that this tulip mosaic is the oldest known plant virus disease, traceable through the four centuries of recorded tulip culture of western Europe to the still earlier gardens of Turkey. Incidentally, these centuries of experience point the moral that any modern tulip fancier who introduces these variegated novelties into his tulip garden should expect to find, as did Clusius four centuries ago, that the "variegation" with attendant weakening of plants will gradually spread to other pure-color tulips. He should, therefore, promptly eliminate these diseased tulips from his garden, unless he is more interested in verifying history than in maintaining the vigor and color of his flowers.

L. R. JONES

UNIVERSITY OF WISCONSIN

THE PARASITE INDUCING PEARL FORMATION IN AMERICAN FRESH-WATER UNIONIDAE

IT has been known for many years that the best pearls are formed around the transparent spherical cysts of larval parasitic worms. In Europe the cysts of larval trematodes serve as nuclei for pearls, while larval cestodes induce pearl formation in the pearl oysters of the Indian Ocean. Apparently no one