PART IV.

SUMMARY.

The detailed lists of the preceding pages show that we have represented here four faunas. The work of Dr. H. S. Williams^{*} has left little to be done in determining their composition and order of sequence. The efforts of the writer have therefore been directed toward ascertaining the extreme limits of the vertical range of the several species beyond their zone of culmination, by a minute study of several sections. A precise knowledge of the vertical range of the dominant species of a fauna is very essential to a correct interpretation of its history. If the principal species of a fauna can be shown to be entirely absent from the beds below it, then it may be considered a migratory fauna. The scarcity of the principal representatives of a fauna below their horizon of culmination might give a locally developed fauna the appearance of having migrated into a region.

The principal result of this study has been to extend the vertical range of some of the well known species of these faunas, and to determine more definitely that of others. The range of a number of these is shown by the table. By reference to the same, it will be seen that two of the most abundant and characteristic Portage species, *Glyptocardia speciosa* and *Lunulicardium fragile*, have been found in the midst of the Ithaca group. One of the most interesting of such forms here—*Spirifer lævis*—has been found 110 feet below the well known zone at the base of Ithaca falls. Some of the species of the Ithaca fauna not previously known below it, have been found in the Portage rocks. One of the most interesting of these is *Ryhnchonella pugnus* Martin, which I have found at station 7–5. *Plumulina plumaria* has been found at a few localities associated with *Spirifer lævis* near the middle of the Portage.

The number of "courrent Hamilton fossils previously known from the Ithaca group has been increased by the discovery of some additional species. These are *Phacops rana*, which occurs abundantly in a single layer in the Ithaca group (station 8-4), *Orthis vanuxemi*, also abundant at a single locality (station 6-1), *Modiomorpha mytiloides, Nuculites triqueter, Strophodonta perplana*, *Phthonia cylindrica*.

* Bull. U. S. Geol. Surv., No. 3.

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