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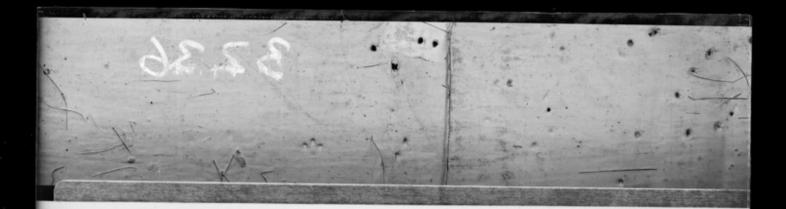
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THE NATURE OF THE CELL AND PROTOPLASM
Relative Number of Molecules of the Various Types of
Protoplasmic Materials

SUBSTANCE	PERCENTAGE OF FRESH WEIGHT	AVERAGE MOLECU- LAR WEIGHT	NUMBER OF MOLE- CULES IN RELATION TO PROTEIN
Water	85	18	18,000
Protein	10	36,000	10,000
Fatty substances	2	700	10
Other organic materials	1.5	250	20
Inorganic material	1.5	55	100

Iowa, Iowa State College Press, p. 46.

It is instructive to compare the relative numbers of molecules in the different constituents of protoplasm (see Table 8.2). The relative numbers of molecules can be determined from the amount of each substance and from the average molecular weight of each class. For purposes of calculation protein is arbitrarily assigned an average molecular weight of 36,000. Calculation discloses that for every protein molecule 18,000 water molecules are available. From the table one may observe that in spite of the comparatively large percentage of protein content of protoplasm, the protein molecules in protoplasm are present in smallest numbers. The data in the table are useful since they indicate the availability of the various molecules for combination with protein or for osmotic action.

Water, Free and Bound

Cell foods reach the cell dissolved in water, and apparently all the chemical reactions of importance to life occur in aqueous solution. Water