SUMMARY.

The points discussed in the preceding pages may be summarized as follows :---

I. The composition of the ocean represents the result, on the one hand, of the leaching action of water on the land surfaces of the globe continued throughout all the geological periods, and, on the other, of the chemical and other agencies modifying or enhancing the power of sea water to retain in solution the mineral constituents derived from the land surfaces through river water since the beginning of the primeval period.

2. The relative proportions of the elements, and especially of sodium, potassium, calcium, and magnesium, in river discharge are not parallel to those of the same elements found in the sea. In river water, the calcium is always more, and the potassium less, abundant than the sodium, while the magnesium appears to approximate in amount the latter. In the sea, on the other hand, the sodium is much more abundant than the other three elements, and this is due to the continuous precipitation of a very great portion of the calcium added by rivers as carbonate, to the subsequent fixation in the limestone so formed of the magnesium as carbonate, and to the removal, continually taking place, of potassium, which is affected through animal and vegetable forms, and its consequent fixation in submarine deposits as glauconite and other potassium-holding minerals. The calcium and potassium appear to be stationary in amount, while the magnesium added by river water appears to exceed in amount that removed from the sea, and, in consequence, is slowly on the increase in the ocean, but its rate of increase is far behind that of the sodium.

3. The relative proportions of the elements in the ocean have, therefore, always been changing, and these proportions must have been, in the earlier geological periods, very different from what they are now. In the ocean of the earliest period the relative proportions of the elements approximated those found in river discharge, or rather those found in fresh water shed from areas covered with Archæan rocks. In this the potassium approaches the sodium in amount while the magnesium exceeds the latter, and the calcium is relatively very abundant.

4. This condition must have continued until living forms made

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