

interior of the animal, which is transformed into carbonate on the outside.<sup>363</sup> Messrs. Murray and Irvine have experimentally proved that sea-animals can secrete carbonate of lime from sea-water from which carbonate of lime is rigidly excluded, and thus that the other lime salts, notably the sulphate, are made use of in the process. They infer that the living tissues of the lower animals and the effete secretions of higher forms, produce carbonate of ammonia, which in presence of the sulphate of lime of sea-water becomes carbonate of lime and sulphate of ammonia.<sup>364</sup> The great majority of the accumulations formed of animal remains are calcareous. Those organisms which secrete their lime as calcite produce much more durable skeletons or tests than those which accumulate it in the form of aragonite. Hence among geological formations aragonite shells have in large measure disappeared.<sup>365</sup>

In fresh water, accumulations of animal remains are represented by the *marl* of lakes—a white, chalky deposit consisting of the mouldering remains of *Mollusca*, *Entomostraca*, and partly of fresh-water algæ. On the sea-bottom, in shallow water, they consist of beds of shells, as in oyster-banks. Under favorable conditions, extensive deposits of limestone are now being formed on the sea-floor in tropical latitudes. Mr. Murray, from observations made during the “Challenger” voyage, estimates that in a square mile of the tropical ocean down to a depth of 100 fathoms there are more than 16 tons of calcareous matter in the form of animal and vegetable organisms.<sup>366</sup> These surface organisms, when dead,

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<sup>363</sup> Brit. Assoc. 1881, sects. p. 584.

<sup>364</sup> Proc. Roy. Soc. Edin. xvii. 1889, p. 89.

<sup>365</sup> Sorby, Presidential Address Geol. Soc. 1879; P. F. Kendall, Geol. Mag. 1883, p. 497; V. Cornish and P. F. Kendall, Geol. Mag. 1888, p. 60. See postea, Book V. § ii. 2.

<sup>366</sup> Proc. Roy. Soc. Edin. x. 1880, p. 508.