

represented coral structures in their actual original position, and inclined rather to regard it as a stratified accumulation of coral *débris*, embedding sometimes larger masses of coral colonial growths. Chamisso followed Forster in supposing that the coral reefs began to take shape on the ocean-floor at considerable depths, and their own continued growth brought them ultimately up to the surface. At the same time, from the distribution of coral islands, Chamisso thought it probable that corals settled upon submarine ridges. Eschholz associated the form of the coral islands with the pre-existing form of submarine mountains, whose summits they crown. He explained the origin of atolls on the assumption that when a reef has arrived at considerable dimensions the corals flourish best on the outer edge under the constant wash of the breakers and surf, and the reef tends therefore to increase more rapidly there; the lagoon, which is seldom over 30 fathoms deep, in the opinion of Eschholz, arises from the decrease and even cessation of coral growth in the middle of the reef, where the refuse of molluscan shells and coral fragments accumulates and militates against the proper nourishment of the corals.

Immediately following the results of the Kotzebue Expedition, those of the Freycinet Expedition in the years 1818-20 became known. Quoy and Gaimard published their observations on the mode of life of reef-corals in the *Annales des Sciences naturelles* in 1825. They never found living reef-corals in greater depths than 25-30 feet, and therefore concluded that these polyps could only exist in shallow and warm water, and preferentially in protected bays little affected by storms. Judging also from the small thickness of the raised coral limestones at Timor, Ile-de-France, New Guinea, and the Sandwich Isles, they argued that coral reefs could never be very thick. In confirmation of this result they mentioned how frequently coral reefs occur in a direction continuing that of the mountain-chains on land, while the massive reefs are limited to submarine platforms sloping gently from the shore.

Henrik Steffens in 1822 suggested that coral atolls formed on the summit of submarine volcanoes around the crater of eruption, which was afterwards occupied by the central lagoon of the reef. The same hypothesis was advanced independently by Quoy and Gaimard, and during the Duperry Expedition of 1828 was more closely investigated and accepted by