

CHAPTER VII.

Geographical distribution and migrations of fish—of testacea—Causes which limit the extension of many species—Their mode of diffusion—Geographical range of zoophytes—Their powers of dissemination—Distribution of insects—Migratory instincts of some species—Certain types characterize particular countries—Their means of dissemination—Geographical distribution and diffusion of man—Speculations as to the birth-place of the human species—Progress of human population—Drifting of canoes to vast distances—On the involuntary influence of man in extending the range of many other species.

Geographical Distribution and Migrations of Fish.

ALTHOUGH we are less acquainted with the habitations of marine animals than with the grouping of the terrestrial species before described, yet it is well ascertained that their distribution is governed by the same general laws. The testimony borne by MM. Péron and Lesueur to this important fact is remarkably strong. These eminent naturalists, after collecting and describing many thousand species which they brought to Europe from the southern hemisphere, insist most emphatically on their distinctness from those north of the equator ; and this remark they extend to animals of all classes, from those of a more simple to those of a more complex organization, from the sponges and medusæ to the cetacea. “ Among all those which we have been able to examine,” say they, “ with our own eyes, or with regard to which it has appeared to us possible to pronounce with certainty, there is not a single animal of the southern regions which is not distinguished by essential characters from the analogous species in the northern seas *.

The fish of the Arabian gulf are said to differ entirely from

* Sur les Habitations des Animaux Marins. Ann. du Mus. tom. xv., cited by Prichard, *Phys. Hist. of Mankind*, vol. i. p. 51.

those of the Mediterranean, notwithstanding the proximity of these seas. The flying-fish are found (some stragglers excepted) only between the tropics,—in receding from the line they never approach a higher latitude than the fortieth parallel. Those inhabiting the Atlantic are said to be different species from those of the eastern ocean*. The electric gymnotus belongs exclusively to America, the trembler, or *Silurus electricus* to the rivers of Africa; but the torpedo, or crampfish, is said to be dispersed over all tropical and many temperate seas †.

All are aware that there are certain fish of passage which have their periodical migrations like some tribes of birds. The salmon, towards the season of spawning, ascends the rivers for hundreds of miles, leaping up the cataracts which it meets in its course, and then retreats again into the depths of the ocean. The herring and the haddock, after frequenting certain shores in vast shoals for a series of years, desert them again and resort to other stations, followed by the species which prey on them. Eels are said to descend into the sea for the purpose of producing their young, which are seen returning into the fresh-water by myriads, extremely small in size, but possessing the power of surmounting every obstacle which occurs in the course of a river, by applying their slimy and glutinous bodies to the surface of rocks, or the gates of a lock, even when dry, and so climbing over it ‡.

Gmelin says, that the anseres subsist in their migrations on the spawn of fish, and that oftentimes when they void the spawn, two or three days afterwards, the eggs retain their vitality unimpaired §. When there are many disconnected freshwater-lakes in a mountainous region, at various elevations, each remote from the other, it has often been deemed inconceivable how they could all become stocked with fish from one common source; but it has been suggested, that the minute eggs of

* Malte-Brun, vol. i. p. 507.

† Ibid.

‡ Phil. Trans. 1747, p. 395.

§ Amœn. Acad., Essay 75.

these animals may sometimes be entangled in the feathers of water-fowl. These, when they alight to wash and plume themselves in the water, may often unconsciously contribute to propagate swarms of fish, which, in due season, will supply them with food. Some of the water-beetles, also, as the dytiscidæ, are amphibious, and in the evening quit their lakes and pools, and flying in the air transport the minute ova of fishes to distant waters. In this manner some naturalists account for the fry of fish appearing occasionally in small pools caused by heavy rains.

Geographical Distribution and Migrations of Testacea.

The testacea, of which so great a variety of species occurs in the sea, are a class of animals of peculiar importance to the geologist, because their remains are found in strata of all ages, and generally in a higher state of preservation than those of other organic beings. Climate has a decided influence on the geographical distribution of species in this class; but as there is much greater uniformity of temperature in the waters of the ocean, than in the atmosphere which invests the land, the diffusion of many marine molluscs is extensive.

Some forms, as those of the nautili, volutæ, and cyprææ, attain their fullest development in warm latitudes; and most of their species are exclusively confined to them. Péron and Lesueur remark, that the *Haliotis gigantea*, of Van Dieman's land, and the *Phasianella*, diminish in size as they follow the coasts of New Holland to King George's straits, and entirely disappear beyond them*. Almost all the species of South American shells differ from those of the Indian archipelago in the same latitudes; and on the shores of many of the isles of the South Pacific, peculiar species have been obtained. But we are as yet by no means able to sketch out the submarine provinces of shells, as the botanist has done those of the terrestrial, and even of the subaqueous plants. There can be little

* Ann. du Mus. d'Hist. Nat., tom. xv.

doubt, however, that the boundaries in this case, both of latitude and longitude, will be found in general well defined. The continuous lines of continents, stretching from north to south, prevent a particular species from belting the globe, and following the direction of the isothermal lines. The inhabitants of the West Indian seas, for example, cannot enter the Pacific without passing round through the inclement climate of Cape Horn.

Currents also flowing permanently in certain directions, and the influx at certain points of great bodies of fresh-water, limit the extension of many species. Those which love deep water are arrested by shoals; others, fitted for shallow seas, cannot migrate across unfathomable abysses. Some few species, however, have an immense range, as the *Bulla aperta* for example, which is found in almost all zones. The habitation of the *Bulla striata* extends from the shores of Egypt to the coasts of England and France, and it recurs again in the seas of Senegal, Brazil, and the West Indies. The *Turbo petraeus* inhabits the seas of England, Guadaloupe, and the Cape of Good Hope*, and many instances of a similar kind might be enumerated. The *Ianthina fragilis* has wandered into almost every sea both tropical and temperate. This "common oceanic snail" derives its buoyancy from an admirably contrived float, which has enabled it not only to disperse itself so universally, but to become an active agent in disseminating other species which attach themselves, or their ova, to its shell †.

It is evident that among the testacea, as in plants and the higher orders of animals, there are species which have a power of enduring a wide range of temperature, whereas others cannot resist a considerable change of climate. Among the fresh-

* Fér. Art. Geogr. Phys. Dict. Class. d'Hist. Nat.

† Mr. Broderip possesses specimens of *Ianthina fragilis*, bearing more than one species of barnacle (*Pentelasmis*), presented to him by Captain King and Lieutenant Graves. One of these specimens, taken alive by Captain King far at sea, and a little north of the equator, is so loaded with those cirrhipeds, and with numerous ova, that all the upper part of its shell is invisible.

water molluscs, and those which breathe air, Ferrussac mentions a few instances of species of almost universal diffusion.

The *Helix putris* (*Succinea putris*, Lam.) so common in Europe, where it reaches from Norway to Italy, is also found in Egypt, in the United States, in Newfoundland, Jamaica, Tranquebar, and, it is even said, in the Marianne Isles. As this animal inhabits constantly the borders of pools and streams where there is much moisture, it is not impossible that different water-fowl have been the agents of spreading some of its minute eggs, which may have been entangled in their feathers. *Helix aspersa*, one of the commonest of our larger land-shells, is found in South America, at the foot of Chimborazo, as also in Cayenne. Some conchologists have conjectured, that it was accidentally imported in some ship; for it is an eatable species, and these animals are capable of retaining life, during long voyages, without air or nourishment*.

Mr. Lowe, in a memoir just published in the Cambridge Transactions, enumerates seventy-one species of land mollusca, collected by him in the islands of Madeira and Porto Santo, sixty of which belonged to the genus *Helix* alone, including as subgenera *Bulimus* and *Achatina*, and excluding *Vitрина* and *Clausilia*;—forty-four of these are new. It is remarkable, that very few of the above-mentioned species are common to the neighbouring archipelago of the Canaries; but it is a still more striking fact, that of the sixty species of the three genera above-mentioned, thirty-one are natives of Porto Santo; whereas, in Madeira, which contains ten times the superficies, were found but twenty-nine. Of these only four were common

* Four individuals of a large species of *Bulimus*, from Valparaiso, were brought to England by Lieutenant Graves, who accompanied Captain King in his late expedition to the Straits of Magellan. They had been packed up in a box and enveloped in cotton, two for a space of thirteen, one for seventeen, and a fourth for upwards of twenty months; but on being exposed, by Mr. Broderip, to the warmth of a fire in London, and provided with tepid water and leaves, they revived, and are now living in Mr. Loddiges' palm-house.

to the two islands, which are only separated by a distance of twelve leagues; and two even of these four (namely, *Helix rhodostoma* and *H. ventrosa*) are species of general diffusion, common to Madeira, the Canaries, and the South of Europe*.

The confined range of these molluscs may easily be explained, if we admit that species have only one birth-place; and the only problem to be solved would relate to the exceptions—to account for the dissemination of some species throughout several isles and the European continent. May not the eggs, when washed into the sea by the undermining of cliffs, float uninjured to a distant shore?

Notwithstanding the proverbially slow motion of snails and molluscs in general, and although many aquatic species adhere constantly to the same rock for their whole lives, they are by no means destitute of provision for disseminating themselves rapidly over a wide area. Some lay their eggs in a sponge-like nidus, wherein the young remain enveloped for a time after their birth, and this buoyant substance floats far and wide as readily as sea-weed. The young of other viviparous tribes are often borne along, entangled in sea-weed. Sometimes they are so light that, like grains of sand, they can be easily moved by currents. *Balani* and *serpulæ* are sometimes found adhering to floating cocoa-nuts, and even to fragments of pumice. In rivers and lakes, on the other hand, aquatic univalves usually attach their eggs to leaves and sticks which have fallen into the water, and which are liable to be swept away, during floods, from tributaries to the main streams, and from thence to all parts of the same basins. Particular species may thus migrate during one season from the head waters of the Mississippi, or any other great river, to countries bordering the sea, at the distance of many thousand miles.

An illustration of the mode of attachment of these eggs will be seen in the annexed diagram. (No. 1.)

* Camb. Phil. Trans. vol. iv. 1831.

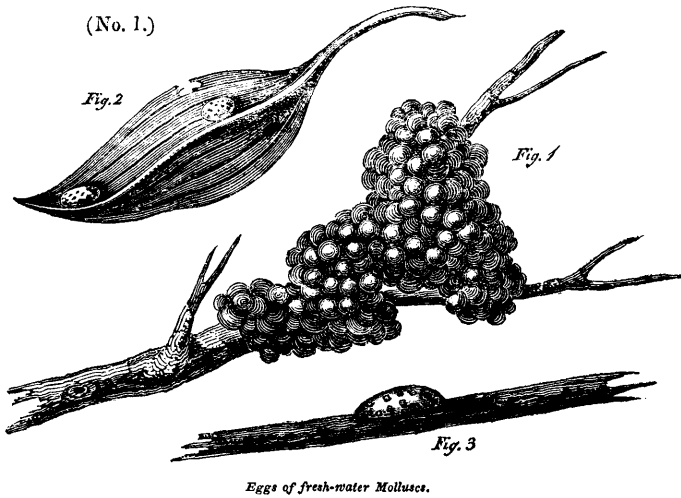


Fig. 1. Eggs of *Ampullaria ovata* (a fluviatile species), fixed to a small sprig which had fallen into the water.

Fig. 2. Eggs of *Planorbis albus*, attached to a dead leaf lying under water.

Fig. 3. Eggs of the common *Limneus* (*L. vulgaris*), adhering to a dry stick under water.

The habit of some testacea to adhere to floating wood is proved by their fixing themselves to the bottoms of ships. By this mode of conveyance *Mytilus polymorphus* has been brought from northern Europe to the Commercial Docks in the Thames, where the species is now domiciled.

Geographical Distribution and Migrations of Zoophytes.

Zoophytes are very imperfectly known, but there can be little doubt that each maritime region possesses species peculiar to itself. The madrepores, or lamelliferous polyparia, are found in their fullest development only in the tropical seas of Polynesia and the East and West Indies, and this family is represented only by a few species in our seas. Those even of the Mediterranean are inferior in size, and, for the most part, different from such as inhabit the tropics. Péron and Lesueur,

after studying the *Holothuriæ*, *Medusæ*, and other congeners of delicate and changeable forms, came to the conclusion that each kind has its place of residence determined by the temperature necessary to support its existence. Thus, for example, they found the abode of *Pyrosoma Atlantica* to be confined to one particular region of the Atlantic ocean*.

Let us now inquire how the transportation of polyps from one part of the globe to another is effected. Many of them, as in the families *Flustra* and *Sertularia*, attach themselves to sea-weed, and are occasionally drifted along with it. Many fix themselves to the shells of gasteropods, and are thus borne along by them to short distances. Some polyps, like the sea-pens, swim freely about in the sea. But the most frequent mode of transportation, probably, consists in the buoyancy of their eggs, or certain small vesicles which are detached and are capable of becoming the foundation of a new colony. These gems, as they have been called, may be swept along by a wave that breaks upon a coral-reef, and may then be borne by a current to a distance.

That some zoophytes adhere to floating bodies is proved by their being found attached to the bottoms of ships, as in the case of testacea before alluded to.

Geographical Distribution and Migrations of Insects.

Before we conclude our sketch of the manner in which the habitable parts of the earth are shared out among particular assemblages of organic beings, we must offer a few remarks on insects, which, by their numbers, and the variety of their powers and instincts, exert a prodigious influence in the economy of animate nature. As a large portion of these minute creatures are strictly dependent for their subsistence on certain species of vegetables, the entomological provinces must coincide in a considerable degree with the botanical.

All the insects, says Latreille, brought from the eastern parts

* *Voy. aux Terres Australes*, tome i. p. 492.

of Asia and China, whatever be their latitude and temperature, are distinct from those of Europe and of Africa. The insects of the United States, although often they approach very close to our own, are nevertheless specifically distinguishable by some characters. In South America, the equinoctial lands of New Grenada and Peru on the one side, and of Guiana on the other, contain for the most part distinct groups; the Andes forming the division, and interposing a narrow line of severe cold between climates otherwise very similar*.

The insects of the United States, even those of the northern provinces as far as Canada, differ specifically from the European, while those of Greenland appear to be in a great measure identical with our own. Some insects are very local, while a few, on the contrary, are common to remote countries, between which the torrid zone and the ocean intervene. Thus our painted lady butterfly (*Vanessa Cardui*) reappears in New Holland and Japan with scarcely a varying streak †. The same species is said to be one of the few insects which are universally dispersed over the earth, being found in Europe, Asia, Africa, and America; and its wide range is the more interesting because it seems explained by its migratory instinct, seconded, no doubt, by a capacity enjoyed by few species, of enduring a great diversity of temperature.

A vast swarm of this species, forming a column from ten to fifteen feet broad, was, a few years since, observed in the Canton de Vaud; they traversed the country with great rapidity from north to south, all flying onwards in regular order, close together, and not turning from their course on the approach of other objects. Professor Bonelli, of Turin, observed, in March of the same year, a similar swarm of the same species, also directing their flight from north to south, in Piedmont, in such immense numbers, that at night the flowers were literally covered with them. They had been traced from

* Géographie Générale des Insectes et des Arachnides. Mém. du Mus. d'Hist Nat. tome iii.

† Kirby and Spence, vol. iv. p. 487.

Coni, Raconi, Susa, &c. A similar flight at the end of the last century is recorded by M. Louch, in the Memoirs of the Academy of Turin. The fact is the more worthy of notice, because the caterpillars of this butterfly are not gregarious, but solitary from the moment that they are hatched; and this instinct remains dormant, while generation after generation passes away, till it suddenly displays itself in full energy when their numbers happen to be in excess.

Not only peculiar species but certain types distinguish particular countries; and there are groups, observes Kirby, which represent each other in distant regions, whether in their form, their functions, or in both. Thus the honey and wax of Europe, Asia, and Africa, are in each case prepared by bees congenerous with our common hive-bee (*Apis*, Latr.); while in America, this genus is nowhere indigenous, but is replaced by *Melipona* and *Trigona*; and in New Holland by a still different, but undescribed type*.

As almost all insects are winged, they can readily spread themselves wherever their progress is not opposed by uncongenial climates, or by seas, mountains, and other physical impediments; and these barriers they can sometimes surmount by abandoning themselves to violent winds, which, as we before stated, when speaking of floating seeds, may in a few hours carry them to very considerable distances. On the Andes some sphinxes and flies have been observed by Humboldt, at the height of nineteen thousand one hundred and eighty feet above the sea, and which appeared to him to have been involuntarily carried into these regions by ascending currents of air †.

White mentions a remarkable shower of aphides which seem to have emigrated, with an east wind, from the great hop plantations of Kent and Sussex, and blackened the shrubs and vegetables where they alighted at Selbourne, spreading at the same time in great clouds all along the vale from Farnham to

* Kirby and Spence, vol. iv. p. 497.

† Description of the Equatorial Regions.—Malte-Brun, vol. v. p. 379.

Alton. These aphides are sometimes accompanied by vast numbers of the common lady-bird (*Coccinella septem-punctata*), which feed upon them*.

It is remarkable, says Kirby, that many of the insects which are occasionally observed to emigrate, as, for instance, the libellulæ, coccinellæ, carabi, cicadæ, &c., are not usually social insects, but seem to congregate, like swallows, merely for the purpose of emigration †. Here, therefore, we have an example of an instinct developing itself on certain rare emergencies, causing unsocial species to become gregarious, and to venture sometimes even to cross the ocean.

To the armies of locusts darkening the air in Africa, and traversing the globe from Turkey to our southern counties in England, we need not here allude. When the western gales sweep over the Pampas, they bear along with them myriads of insects of various kinds. As a proof of the manner in which species may be thus diffused, we may mention that when the Creole frigate was lying in the outer roads off Buenos Ayres, in 1819, at the distance of six miles from the land, her decks and rigging were suddenly covered with thousands of flies and grains of sand. The sides of the vessel had just received a fresh coat of paint, to which the insects adhered in such numbers as to spot and disfigure the vessel, and to render it necessary partially to renew the paint ‡. Captain W. H. Smyth was obliged to repaint his vessel, the *Adventure*, in the Mediterranean, from the same cause. He was on his way from Malta to Tripoli, when a southern wind blowing from the coast of Africa, then one hundred miles distant, drove such myriads of flies upon the fresh paint, that not the smallest point was left unoccupied by insects.

To the southward of the river Plate, off Cape St. Antonio, and at the distance of fifty miles from land, several large dragon-flies alighted on the *Adventure* frigate, during Captain King's late expedition to the Straits of Magellan. If

* Kirby and Spence, vol. ii. p. 9, 1817.

† Vol. ii. p. 12.

‡ I am indebted to Lieutenant Graves, R.N. for this information.

the wind abates when insects are thus crossing the sea, the most delicate species are not necessarily drowned, for many can repose without sinking on the unruffled surface of the deep. The slender, long-legged tipulæ have been seen standing on the surface of the sea, when driven out far from our coast, and took wing immediately on being approached*. Exotic beetles are sometimes thrown on our shore, which revive after having been long drenched in salt-water; and the periodical appearance of some conspicuous butterflies amongst us, after being unseen for five or fifty years, has been ascribed, not without probability, to the agency of the winds.

Inundations of rivers, observes Kirby, if they happen at any season except in the depth of winter, always carry down a number of insects, floating on the surface of bits of stick, weeds, &c., so that when the waters subside, the entomologist may generally reap a plentiful harvest. In the dissemination, moreover, of these minute beings, as in that of plants, the larger animals play their part. Insects are, in numberless instances, borne along in the coats of animals, or the feathers of birds; and the eggs of some species are capable, like seeds, of resisting the digestive powers of the stomach, and after they are swallowed with herbage, may be ejected again unharmed in the dung.

Geographical Distribution and Diffusion of Man.

We have reserved for the last our observations on the range and diffusion of the human species over the earth, and the influence of man, in spreading other animals and plants, especially the terrestrial.

Many naturalists have amused themselves in speculating on the probable birth-place of mankind, the point from which, if we assume the whole human race to have descended from a single pair, the tide of emigration must originally have proceeded. It has been always a favourite conjecture, that this birth-place was situated within or near the tropics, where per-

* I state this fact on the authority of my friend, Mr. Curtis.

petual summer reigns, and where fruits, herbs, and roots, are plentifully supplied throughout the year. The climate of these regions, it has been said, is suited to a being born without any covering, and who had not yet acquired the arts of building habitations or providing clothes.

“The hunter state,” it has been argued, “which Montesquieu placed the first, was probably only the second stage to which mankind arrived, since so many arts must have been invented to catch a salmon or a deer, that society could no longer have been in its infancy when they came into use*.” When regions where the spontaneous fruits of the earth abound became overpeopled, men would naturally diffuse themselves over the neighbouring parts of the temperate zone; but a considerable time would probably elapse before this event took place; and it is possible, as a writer before cited observes, that in the interval before the multiplication of their numbers and their increasing wants had compelled them to emigrate, some arts to take animals were invented, but far inferior to what we see practised at this day among savages. As their habitations gradually advanced into the temperate zone, the new difficulties they had to encounter would call forth by degrees the spirit of invention, and the probability of such inventions always rises with the number of people involved in the same necessity †.

A distinguished modern writer, who coincides for the most part in the views of Aphonin above mentioned, has introduced one of the persons in his second dialogue as objecting to the theory of the human race having gradually advanced from a savage to a civilized state, on the ground that “the first man must have inevitably been destroyed by the elements or devoured by savage beasts, so infinitely his superiors in physical force ‡.” He then contends against the difficulty here started

* Rev. J. F. Brand, commenting on Aphonin, *Amœn. Acad.* vol. vii. p. 409. Brand's *Select Dissert.* from the *Amœn. Acad.* vol. i. p. 118.

† *Idem.*, *ib.*

‡ Sir H. Davy, *Consolations in Travel*, p. 74.

by various arguments, all of which were, perhaps, superfluous, for if a philosopher is pleased to indulge in conjectures on this subject, why should he not assign, as the original seat of man, some one of those large islands within the tropics, which are as free from wild beasts as Van Diemen's Land or Australia? Here man may have remained for a period peculiar to a single isle, just as some of the large anthropomorphous species are now limited to one island within the tropics. In such a situation, the new-born race might have lived in security, though far more helpless than the New Holland savages, and might have found abundance of vegetable food. Colonies may afterwards have been sent forth from this mother country, and then the peopling of the earth may have proceeded according to the hypothesis before alluded to.

In an early stage of society the necessity of hunting acts as a principle of repulsion, causing men to spread with the greatest rapidity over a country, until the whole is covered with scattered settlements. It has been calculated that eight hundred acres of hunting-ground only produce as much food as half an acre of arable land. When the game has been in a great measure exhausted, and a state of pasturage succeeds, the several hunter tribes, being already scattered, may multiply in a short time into the greatest number which the pastoral state is capable of sustaining. The necessity, says Brand, thus imposed upon the two savage states, of dispersing themselves far and wide over the country, affords a reason why, at a very early period, the worst parts of the earth may have become inhabited.

But this reason it may be said is only applicable in as far as regards the peopling of a continuous continent; whereas the smallest islands, however remote from continents, have almost invariably been found inhabited by man. St. Helena, it is true, afforded an exception; for when that island was discovered in 1501, it was only inhabited by sea-fowl, and occasionally by seals and turtles, and was covered with a forest of trees and shrubs, all of species peculiar, as we before observed,

with one or two exceptions, and which seem to have been expressly created for this remote and insulated spot.

But very few of the numerous coral islets and volcanos of the vast Pacific, capable of sustaining a few families of men, have been found untenanted, and we have, therefore, to inquire whence and by what means, if all the members of the great human family have had one common source, could those savages have migrated. Cook, Forster, and others have remarked that parties of savages in their canoes must often have lost their way and must have been driven on distant shores, where they were forced to remain, deprived both of the means and of the requisite intelligence for returning to their own country. Thus Captain Cook found on the island Wateoo, three inhabitants of Otaheite, who had been drifted thither in a canoe, although the distance between the two isles is five hundred and fifty miles. In 1696, two canoes containing thirty persons, who had left Ancorso, were thrown by contrary winds and storms on the island of Samar, one of the Philippines, at a distance of eight hundred miles. In 1721, two canoes, one of which contained twenty-four, and the other six persons, men, women, and children, were drifted from an island called Baroilep, to the island of Guam, one of the Marians*.

Kotzebue, when investigating the Coral isles of Radack, at the eastern extremity of the Caroline isles, became acquainted with a person of the name of Kadu, who was a native of Ulea, an isle fifteen hundred miles distant, from which he had been drifted with a party. Kadu and three of his countrymen, one day, left Ulea in a sailing boat, when a violent storm arose, and drove them out of their course; they drifted about the open sea for eight months, according to their reckoning by the moon, making a knot on a cord at every new moon. Being expert fishermen they subsisted entirely on the produce of the sea; and when the rain fell, laid in as much fresh-water as they had vessels to contain it. "Kadu," says Kotzebue, "who was the

* Malte-Brun's Geography, vol. iii, p. 419.

best diver, frequently went down to the bottom of the sea, where it is well known that the water is not so salt, with a cocoa nut shell, with only a small opening." When these unfortunate men reached the isles of Radack, every hope and almost every feeling had died within them; their sail had long been destroyed, their canoe had long been the sport of winds and waves, and they were picked up by the inhabitants of Aur, in a state of insensibility *; but by the hospitable care of those islanders they soon recovered, and were restored to perfect health.

Captain Beechey, in his late voyage to the Pacific, fell in with some natives of the Coral Islands, who had in a similar manner been carried to a great distance from their native country. They had embarked to the number of one hundred and fifty souls, in three double canoes, from Anaa, or Chain Island, situate about three hundred miles to the eastward of Otaheite. They were overtaken by the monsoon, which dispersed the canoes, and after driving them about the ocean, left them becalmed, so that a great number of persons perished. Two of the canoes were never heard of, but the other was drifted from one uninhabited island to another, at each of which the voyagers obtained a few provisions; and at length, after having wandered for a distance of six hundred miles, they were found and carried to their home in the Blossom †.

The space traversed in some of these instances was so great, that similar accidents might suffice to transport canoes from various parts of Africa to the shores of South America, or from Spain to the Azores, and thence to North America. So that man, even in a rude state of society, is liable to be scattered involuntarily by the winds and waves over the globe, in a manner singularly analogous to that in which many plants and animals are diffused. We ought not then to wonder that during the ages required for some tribes of the human race to attain that advanced stage of civilization which empowers the

* Kotzebue's Voyage, 1815—1818. Quarterly Review, vol. xxvi. p. 361.

† Narrative of a Voyage to the Pacific, &c., in the years 1825, 1826, 1827, 1828, p. 170.

navigator to cross the ocean in all directions with security, the whole earth should have become the abode of rude tribes of hunters and fishers. Were the whole of mankind now cut off, with the exception of one family, inhabiting the old or new continent, or Australia, or even some coral islet of the Pacific, we should expect their descendants, though they should never become more enlightened than the South Sea Islanders or the Esquimaux, to spread in the course of ages over the whole earth, diffused partly by the tendency of population to increase beyond the means of subsistence, in a limited district, and partly by the accidental drifting of canoes by tides and currents to distant shores.

*Involuntary influence of Man in diffusing Animals and
Plants.*

Many of the general remarks which we made respecting the influence of man in spreading or in checking the diffusion of plants, apply equally to his relations with the animal kingdom. We shall be led on a future occasion to speak of the instrumentality of our species in naturalizing useful animals and plants in new regions, when we explain our views of the effects which the spreading and increase of certain species exert in the extirpation of others. At present we shall confine ourselves to a few remarks on the involuntary aid which man lends to the dissemination of species.

In the mammiferous class our influence is chiefly displayed in increasing the number of quadrupeds which are serviceable to us, and in exterminating or reducing the number of those which are noxious.

Sometimes, however, we unintentionally promote the multiplication of inimical species, as when we introduced the rat, which was not indigenous in the New World, into all parts of America. They have been conveyed over in ships, and now infest a great multitude of islands and parts of that continent. In like manner the Norway rat has been imported into England, where it plunders our property in ships and houses.

The great viper, *fer de lance*, a species no less venomous than the rattle-snake, which now ravages Martinique and St. Lucia, was accidentally introduced by man, and exists in no other part of the West Indies.

Many parasitic insects, which attack our persons, and some of which are supposed to be peculiar to our species, have been carried into all parts of the earth, and have as high a claim as man to an *universal* geographical distribution.

A great variety of insects have been transported in ships from one country to another, especially in warmer latitudes. Notwithstanding the coldness of our climate, we have been unable to prevent the cockroach (*Blatta orientalis*), from entering and diffusing itself in our ovens and kneading troughs, and availing itself of the artificial warmth which we afford. It is well known also that beetles, and many other kinds of ligniperdous insects, have been introduced into Great Britain in timber; especially several North American species. "The commercial relations," says Malte-Brun *, "between France and India, have transported from the latter country the aphis, which destroys the apple-tree, and two sorts of Neuroptera, the *lucifuga* and *flavicola*, mostly confined to Provence and the neighbourhood of Bordeaux, where they devour the timber in the houses and naval arsenals."

Among molluscs we may mention the *teredo navalis*, which is a native of equatorial seas, but which, by adhering to the bottom of ships, was transported to Holland, where it has been most destructive to vessels and piles. The same species has also become naturalized in England, and other countries enjoying an extensive commerce.

In all these and innumerable other instances, we may regard the involuntary agency of man as strictly analogous to that of the inferior animals. Like them we unconsciously contribute to extend or limit the geographical range and numbers of certain species, in obedience to general rules in the economy of nature, which are for the most part beyond our control.

* Syst. of Geog., vol. viii., p. 169.