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- ART. III.—1. *Travels in the East Indian Archipelago.* By Albert S. Bickmore, M.A., &c. London, 1868.
2. *The Malay Archipelago: the Land of the Orang-utan and the Bird of Paradise.* A narrative of Travel, with Studies of Man and Nature. By A. R. Wallace. London, 1869.

HAD the atlas of an old Greek geographer approached in any degree to the completeness and accuracy of a modern scientific atlas, we should without doubt have found the 'Islands of the Blessed' placed at a very different part of the compass from that Far West, to which their local habitation was popularly assigned by the ancients. Not amidst the waters of the Atlantic, with its mighty tides and fierce tempests—though sunny Madeira offers its health-giving skies, and from over the Mare del Sargasso come spicy breezes, which deceived that grand old sailor, Cristoval Colon, into believing that he had wellnigh circumnavigated the world—but rather in those Eastern Seas, where Nature puts man's language to shame when it tries to describe her beauty, where birds vie in brilliancy with the ruby and the emerald, where Nature scatters her choicest treasures with lavish prodigality, would they have placed their earthly paradise. Somewhere amidst those islands of romance and adventure they might well have imagined the summit of earthly happiness could be attained. Any new work on these lovely regions would have been acceptable. A hearty welcome will be willingly accorded to the two very remarkable and most interesting books which we have placed at the head of this article.

The present accomplished director of the Irish Geological Survey, in his valuable account of the expedition of H.M.S. 'Fly'*—a work we shall often have occasion to refer to, as it relates to a large portion of the region traversed by Professor Bickmore and Mr. Wallace—complains, with a good deal of reason, that labours of details about reefs and shoals, 'useful though not brilliant, are all that Cook and the illustrious navigators of old have left for the moderns to aspire to.' Still we

* Narrative of the Surveying Voyage of H.M.S. 'Fly.' By J. Beete Jukes. London, 1847.

have only to look at such a map as that in 'Hawksworth's Voyages' and the one given by Professor Bickmore, to see how much our knowledge of the Islands of the Pacific is corrected and enlarged as compared with what the activity of the latter part of the eighteenth century, however great, could supply. But no sooner do we turn our attention to the natural history of these regions, than we see what a mighty stride we have made of late years towards perfection, notwithstanding the many rare treasures still waiting the researches of the enterprising naturalist.

One feeling strongly impressed on our minds by the perusal of these volumes is that, with respect to those islands of loveliness—'gigantic emeralds set in a sea of silver'—the old proverb is startlingly applicable, which tells us that 'all is not gold that glitters.' First of all—we mention it first, because attention has been so strongly drawn to this subject lately—it is a region of earthquakes. Through the Malay Archipelago passes one of the most extensive volcanic belts in the world, running in an easterly direction from Sumatra to the Banda Islands, and then striking suddenly northwards to the Philippines, a distance altogether of over four thousand miles. The breadth of the belt is about fifty miles, but the number of active and extinct volcanoes can only be reckoned by hundreds, Java alone claiming forty-five. The large islands of Borneo and New Guinea are fortunate enough to lie away from this volcanic belt. Fortunate indeed; for Peru itself and Ecuador cannot surpass the tales of ruin and desolation which have come upon many islands in the Pacific. Nowhere else can be found craters which at all rival in size some of those mentioned by Professor Bickmore. In Java, for instance, is that of Tenger, 'with a minor axis of three and a half, and a major axis of four and a half miles.' Mr. Jukes thinks it fully five miles in diameter, and adds that the precipitous sides are a thousand to twelve hundred feet deep. The floor of the crater is a plain of black volcanic sand, pretty firmly compacted together, and called by the Malays the Laut Pasar, or Sandy Sea. 'From this sandy floor rise four cones, where the eruptive force has successively found vent for a time, the greatest being evidently the oldest, and the smallest the present active Bromo, or Brama, from the Sanskrit Brama, the god of fire.* The position and relation of this Bromo as compared to the surrounding crater, is exactly analogous to those which exist between Vesuvius and Monte Somma.'

Mightier still has been the now ruined crater of Lontar, the most important of the Banda Islands. When perfect, it must

* Mr. Jukes says 'Bromo is the ceremonial Javanese word for fire, the ordinary word being "guni."'

have been 'at least *six miles* in diameter, if it were circular.' The crater in this case has been depressed, the bay so formed being eight or nine fathoms deep, and the bottom like that of the Tenger, composed of volcanic sand. It too has its Bromo, the present volcano, Gumong Api. Great elevations have also taken place among the Spice Islands, Governor Arriens having found a recent coral reef as far as eight hundred feet above the sea.

Sumatra can boast of something equally terrific in the great crater of Manindyu. The sides of this crater are something over two thousand feet high. Professor Bickmore gives an account of his descent into it:—

'Down and down we went, until at last I became quite discouraged, and seriously began to think of explaining to my native guide that the wisest heads which lived in my land believe that the centre of the earth is nothing but a mass of molten rock, and to enquire of him whether he was sure we should stop short of such an uncomfortable place. The crater is not circular, but composed of two circles of unequal diameter, which unite on one side. . . . The width of the larger crater at the level of the lake, as given on the best maps I have been able to consult, is three geographical miles; that of the smaller crater, at the same level, two and a quarter miles; and the length of the lake, which lies in a northerly and southerly direction, and is approximately parallel to the great Barizan chain in which it is found, is no less than six geographical miles. Even the famous crater of the Tenger Mountains becomes of moderate dimensions when compared with this.'—pp. 399–401.

But these volcanoes have, as far as any serious consequences go, long been at rest. There are others, however, which meanwhile have not been idle. In 1772, Papandayang, in Java, threw out such an immense quantity of scorize and ashes, that Dr. Junguhn thinks a layer, nearly fifty feet thick, was spread over an area within a radius of seven miles, and yet all this was thrown out during a single night. Forty native villages were buried beneath it, and about three thousand souls are supposed to have perished between this single setting and rising of the sun.' It is on the flank of this volcano that the famous Guevo Upas—the Valley of Poison—is situated, in which that accomplished liar, Mr. N. P. Foersch, a Dutch surgeon at Batavia, declared the deadly Upas-tree grew—'the sole individual of its species;' life of all kind, in earth, air, and water, to a distance of ten or twelve miles from the tree being utterly destroyed. The valley, a small bare place of a pale grey or yellowish colour, as destitute of vegetable as it is of animal life, owes its deadly nature to the carbonic and sulphurous acid gases which are constantly escaping from its crevices. 'Here both

M. Reinwardt and Dr. Junghuhn saw a great number of dead animals of various kinds, as dogs, cats, tigers, rhinoceroses, squirrels, and other rodents, many birds, and even snakes, who had lost their lives in this fatal place. . . . The soft parts of these animals, as the skin, the muscles, and the hair or feathers, were found by both observers quite entire, while the bones had crumbled and mostly disappeared.'

In 1815, Mount Tomboro, in Sumbawa, gave vent to a series of fearful explosions, which at Jokyokarta, in Java, four hundred and eighty miles away, were taken for cannon of some invading army, and troops marched to the imaginary scene of action. For four days the inhabitants of the eastern part of that island never saw the sun, the sky being so darkened by the falling ashes; and at Surabaya, for several months afterwards, it was not so clear as it usually is in the south-east monsoon. At Ternate, seven hundred and twenty miles off, the Resident sent off boats to what he thought was a ship firing signals; and the reports were even heard at Moko-moko, near Bencoolen, nine hundred and twenty miles distant.

'So great was the quantity of ashes thrown out at this time, that it is estimated that on the island of Lombok, about ninety miles distant, *forty-four thousand* persons perished in the famine that followed. Dr. Junghuhn thinks that, within a circle described by a radius of two hundred and ten miles, the average depth of the ashes was at least two feet; this mountain therefore must have ejected several times its own mass, and yet no subsidence has been noticed in the adjoining area, and the only change that has been observed is that during the eruption Tomboro lost two-thirds of its previous height.'—p. 109.

In 1822, a very terrible eruption took place at Mount Galunggung, another of the Javanese volcanoes, in which twenty thousand persons perished, and everything within a radius of twenty miles was utterly destroyed.

One peculiar feature of these volcanoes is alluded to by Prof. Bickmore, whilst speaking of a stream of lava which was ejected from Gunong Api in 1820:—

'This stream of lava is the more remarkable, because it is a characteristic of the volcanoes throughout the archipelago that instead of pouring out molten rock, they only eject hot stones, sand, and ashes, and such materials as are thrown up where the eruptive force has already reached its maximum, and is growing weaker and weaker.'—p. 238.

A similar flow is mentioned as having occurred at Ternate in 1838.

It seems almost incredible that men should voluntarily settle

in a region of such dangerous neighbours. But this is the case. In 1838 a succession of earthquakes at Ternate laid every house in ruins, and yet, 'after all this experience, so great was the attachment of both foreigners and natives to this particular spot that they would not select some one less dangerous on the neighbouring shores, but all returned and once more began to build their houses for another earthquake to lay in the dust, proving that the common remark in regard to them is literally true that they are less afraid of fire than the Hollanders are of water.' Professor Bickmore himself was more easily satisfied. After staying in that island four days, in which he had felt four earthquakes, and the mountain seemed preparing for another grand eruption, he was very glad to change his quarters. Houses of course in such a place are of even more flimsy construction than some of the new streets in our own metropolis. The walls of the house itself are usually of brick or stone, but, the sleeping apartment, which is in the rear, is made of the dried midribs of large palm leaves. The roof is thatched with the leaves themselves, and the whole structure is therefore so light that no one would be seriously injured should it fall on its sleeping occupants. Such continual torturing solicitude changes this place fitted by its fine climate, luxurious vegetation and beautiful scenery, for a paradise into a perfect purgatory.

When Professor Bickmore first reached the scene of his adventures, he had been very anxious to witness an earthquake. His curiosity was not long ungratified; but one night at Amboyna quite cured him of any such fancies for the future. 'Since that dreadful night,' he says, 'there is something in the very sound of the word that makes me shudder.'

Even in earthquakes, however, Mr. Wallace tells us there may be a spice of the ridiculous. He is speaking of a pretty sharp shock he felt at Rurúkan, in Celebes :—

'There was a strange mixture of the terrible and the ludicrous in our situation. We might at any moment have a much stronger shock, which would bring down the house over us, or, what I feared more, cause a landslip, and send us down into the deep ravine on the very edge of which the village is built; yet I could not help laughing each time we ran out at a slight shock, and then in a few minutes ran in again. The sublime and the ridiculous were here literally but a step apart. On the one hand, the most terrible and destructive of natural phenomena was in action around us—the rocks, the mountains, the solid earth, were trembling and convulsed, and we were utterly impotent to guard against the danger that might at any moment overwhelm us. On the other hand was the spectacle of a number of men, women, and children running in and out of their houses, on what each time proved a very unnecessary alarm, as each shock ceased just as it became

strong enough to frighten us. It seemed really very much like "playing at earthquakes," and made many of the people join me in a hearty laugh, even while reminding each other that it really might be no laughing matter.—vol. i., pp. 392, 393.

But it is no easy matter to effect a landing upon some of these lovely islands. First of all, though, thanks especially to the late Rajah Brooke,*—

‘*Multis ille bonis flebilis occidit—*’

the danger is considerably diminished, there are the pirates. ‘The Malays,’ Mr. Jukes tells us, ‘are just in that state of quasi-civilisation in which piracy is most rife. Like the Greeks of old, before the time of Herodotus, or the Northmen among the European nations some hundreds of years ago, piracy is considered honourable among them rather than otherwise. If a Malay chief or petty rajah, ruins himself by gambling or dissipation, he immediately collects a band of disorderly people, always ready to follow him, and issues forth in his prahu to better his fortune. It is considered a brave action, and one worthy of the fame of his ancestors, to carry an European or other large vessel. He has therefore often the incitement of both honour and profit to induce him to commit what we consider a felony.’ A few years since some of these pirates actually ventured upon sending a challenge to the Dutch fleet at Batavia, to come and meet them in the Strait of Macassar. Five ships started, but no pirates appeared.

Again, the surf upon the coral reefs which surrounds nearly all of these islands is often so great that the passage cannot be attempted without the utmost danger. Those of our readers who are familiar with Lieut. Byron’s voyage round the world, will recollect the feelings with which he first saw land after passing the Island of Juan Fernandez, and found it impossible to get on shore :—

‘The scurvy by this time had made dreadful havoc among us, many of my best men being now confined to their hammocks: the poor wretches who were able to crawl upon the deck stood gazing at this little paradise which Nature had forbidden them to enter with sensations which cannot easily be conceived: they saw cocoa-nuts in great abundance, the milk of which is perhaps the most powerful anti-scorbutic in the world: they had reason to suppose that there were

* Mr. Wallace writes of him :—‘ Though by those who knew him not he may be sneered at as an enthusiast adventurer, or abused as a hard-hearted despot, the universal testimony of every one who came in contact with him in his adopted country, whether European, Malay, or Dyak, will be that Rajah Brooke was a great, a wise, and a good ruler, a true and faithful friend, a man to be admired for his talents, respected for his honesty and courage, and loved for his genuine hospitality, his kindness of disposition, and his tenderness of heart.’

limes, bananas, and other fruits which are generally found between the tropics: and to increase their mortification, they saw the shells of many turtle scattered about the shore. These refreshments, indeed, for want of which they were languishing to death, were as effectually beyond their reach as if there had been half the circumference of the world between them; yet their being in sight was no inconsiderable increase of the distress which they suffered by the want of them.'—*Hawkesworth's Voyages*, vol. i., pp. 112, 113. Ed. 1785.

The woodcut at p. 209 of Professor Bickmore's book, of landing through the surf on the south coast of Ceram, gives a lively idea of this danger; the breakers in this instance rising to a height of fifteen feet, and falling on the shore with a roar like heavy thunder. Dangers from this source became very real in a voyage such as the first one Mr. Wallace made in a boat of his own:—

'My first crew ran away; two men were lost for a month on a desert island; we were ten times aground on coral reefs; we lost four anchors; the sails were devoured by rats; the small boat was lost astern; we were thirty-eight days on the voyage home, which should not have taken twelve; we were many times short of food and water; we had no compass-lamp, owing to there not being a drop of oil at Waigiou when we left; and to crown all, during the whole of our voyages from Goram by Ceram to Waigiou, and from Waigiou to Ternate, occupying in all seventy-eight days, or only twelve days short of three months (all in what was supposed to be the favourable season), we had *not one single day of fair wind*. We were always close braced up, always struggling against wind, tide, and lee-way, and in a vessel that would scarcely sail nearer than eight points from the wind. Every seaman will admit that my first voyage in my own boat was a most unlucky one.'—vol. ii., p. 384.

There are times, however, when the Pacific really deserves its name. Sir Edward Belcher mentions an occasion, in which for nearly three weeks not the slightest swell could be observed, 'the ripples on the weather side of reefs not even endangering the bottom of our light boats.' And Professor Bickmore mentions another circumstance worth remembering. 'In all the wide area between Java and the line of islands east to Timur on the south, and the tenth degree of north latitude, none of those frightful gales known in the Bay of Bengal as cyclones, and in the China Sea as 'typhoons,' have ever been experienced. The chief sources of solicitude to the navigator of the Java and Banda Seas, are the strong currents and many reefs of coral.' Mr. Jukes mentions a case where the current was so strong that the ship's real movement was just the reverse of the apparent one. 'It looked exactly as if the islands were drifting rapidly past us,

and as the stern movement of the ship through the air caused the sails to be still further bellied out, as if a pretty fair breeze was blowing, the aspect of things, as we looked from the sails to the land, and the apparently still water alongside, was not a little bewildering. I could easily believe an ignorant and superstitious person would have set the whole down to enchantment.'

Once safely landed, if volcanos are quiet there are still dangers enough and disagreeables in store for the adventurous traveller. The natives, we are afraid, must be described, on the whole, as a very treacherous people. In the island of Ceram no one is allowed to marry until he has cut off one human head at least. 'Heads therefore are in great demand, and perhaps our realisation of this fact made these phrenzied savages the more shocking specimens of humanity. The head of a child will meet the inexorable demands of this bloody law, but the head of a woman is preferred, because it is supposed she can more easily defend herself or escape; for the same reason, the head of a man is held in higher estimation, and the head of a white man is a proof of the greatest bravery, and therefore the most glorious trophy.' The Dyaks of Borneo carry this custom still further. 'There only the heads of men are valued, and new ones must be obtained to celebrate every birth and funeral, as well as marriage.'

Again, we cannot remember without a shudder, that so many of these islanders are, or were very lately, cannibals. The Battas of Sumatra are a notorious instance, all the more remarkable, because they have become civilised enough to invent an alphabet of their own. 'The Rajah of Sipirok assured the governor at Padang that he had eaten human flesh between thirty and forty times, and that he had never in all his life tasted anything that he relished half so well.' On the south-coast of the Island of Sumbawa again there is a tribe called Rakka 'who are reported to be the worst kind of cannibals, accustomed not only to devour their enemies, but the bodies of their deceased relatives.'

There is, however one little bit of comfort for an Englishman. The flesh of a white man is considered so tasteless and insipid as to be in very little demand. Still to find oneself in a Typee valley, even with so sympathizing a companion as that perfection of grace and beauty, Fayaway, cannot by any means be a pleasurable sensation.

To sportsmen of the Gordon-Cumming type, it is no doubt interesting to know that in Sumatra both tigers and elephants are exceedingly abundant, but by the ordinary traveller at least such game could readily be dispensed with. Tigers seem especially abundant. Professor Bickmore says that 'these ravenous beasts infest the whole region in such numbers, and are so daring, that

the rajah assures me that during last year, *five* of the people of this little village [Tanjong Agong, consisting of only eighteen or twenty small houses] were torn to pieces by them while working in the sawas, or while travelling to the neighbouring kampongs.' In Singapore Mr. Wallace had more than once a narrow escape from falling into one of the pits, fifteen or twenty feet deep, set for these creatures, who kill there on an average a Chinaman a day. Neither of our travellers seems to have caught sight of a tiger, though Mr. Wallace says he heard one roar once or twice, and 'it was rather nervous work hunting for insects among the fallen trunks and old sawpits, when one of those savage animals might be lurking close by, waiting an opportunity to spring upon us.' Sumatra also supplies the rhinoceros (found in Malacca as well), and what the natives dread almost as much as the tiger, the wild buffalo :

'Incidis in Scyllam cupiens vitare Charybdim.'

In the northern part of Celebes Professor Bickmore was shown an enormous python. Its head had been taken off, but it had measured, when alive, fifteen feet at least. It was killed whilst trying to swallow a favourite dog belonging to one of the natives. Even larger specimens than this have been met with. We may, perhaps, question the instance given from this island in the 'Bombay Gazette' of August 31, 1799, where the python which killed a Malay sailor is described as thirty feet long; though there seems to be proof of examples very nearly approaching this enormous size. Even then, however, it would be a joke to the monster which many of our readers must have seen in a picture by Daniell. In this instance the python, which had coiled itself round a sailor who had fallen asleep in a boat on the Ganges, was declared to be sixty-two feet and some inches in length. The story which Valerius Maximus mentions of the serpent killed by the soldiers of Regulus near Utica by the assistance of catapults, and measuring 120 feet in length, must be put in the same class as Denys Montfort's kraken octopods scuttling a three-master. Mindanao apparently has the unenviable distinction of being the head-quarters of these monsters. The skin is made by the natives into mocassins, and is said to be far more durable for this purpose than the best kind of leather.

One night, whilst staying in Amboyna, Mr. Wallace heard a rustling in the thatch just over his head, but, as it soon stopped, he thought nothing more of it, and presently fell fast asleep. Next morning, happening to look up, he saw a large snake, which had evidently occupied the same bedroom all night. An alarm was raised, and a Bouru man made a strong noose of rattan, and

then poked the serpent with a long pole till he dislodged him. He then seized it by the tail, and tried, by swinging it round, to strike its head against a tree, which, on a second attempt, he succeeded in doing, and it was then easily killed with a hatchet. The serpent in this case was about twelve feet long, and very thick.

From one of these enormous reptiles Professor Bickmore had a narrow escape. As he was on the point of starting homewards from Singapore, a gentleman just returned from Cambodia brought him a 'specimen,' which he was to accept without knowing what it was. He was somewhat startled to find it a very large python. The alcohol-can had been sent on board ship, and the box accordingly was put into a large boat, placed right side up on the main deck, ready to be operated on next morning. Morning came, but the box was empty; and, after some little search, the python was found under a triangular deck in the bottom of the boat. Professor Bickmore called for a large knife, and tried, by thrusting the blade through a crack and wrenching with all his might, to break the creature's backbone. But the serpent succeeded in pulling the knife out of his hand. He then seized a handspike of iron-wood, and told the second-mate to raise the deck. The rest of the story we must give in the author's own graphic words:—

'As the deck rose, I beheld him coiled up about two feet and a half from my right foot. Suffering the acutest agony from the deep wound I had already given him, he raised his head high out of the midst of his huge coil, his red jaws wide open, and his eyes flashing fire like live coals. I felt the blood chill in my veins as, for an instant, we glanced into each other's eyes, and both instinctively realised that one of us two must die on that spot. He darted at my foot, hoping to fasten his fangs in my canvas shoe, but I was too quick for him, and gave him such a blow over the head and neck that he was glad to coil up again. This gave me time to prepare to deal him another blow, and thus for about fifteen minutes I continued to strike with all my might, and three or four times his jaws came within two or three inches of my canvas shoe. I began now to feel my strength failing, and that I could not hold out more than a moment longer, yet in that moment, fortunately, the carpenter got his wits together, and thought of his broad-axe, and, bringing it to the side of the boat, held up the handle, so that I could seize it while the reptile was coiling up from the last stunning blow. The next time he darted at me I gave him a heavy cut about fifteen inches behind his head, severing the body completely off, except about an inch on the under side, and as he coiled up this part fell over, and he fastened his teeth into his own coils. One cut more, and I seized a rope, and in an instant I tugged him over the boat's side, across the deck, and over the ship's rail into the sea. The long trail of his blood on the deck assured me that I was indeed safe;

and, drawing a long breath of relief, I thanked the Giver of all our blessings.'—pp. 541, 542.

Among minor discomforts, to speak euphemistically, must be reckoned the mosquito, which 'sings the same bloodthirsty tune in our ears' in these regions, with which he prefaces his drinking bouts elsewhere. Still worse is a species of that detestable little beast, the *Acarus*, which makes lying on the grass here in England in the autumn so questionable an enjoyment. Next come leeches. In crossing Sumatra, during which he had followed a stream for about a mile, the Professor found his stockings red with blood. 'Turning them down, I found both ankles perfectly fringed with blood-suckers, some of which had filled themselves until they seemed ready to burst.' On another occasion his guide took him through a morass, where these creatures were to be counted by thousands. 'They are small, being about an inch long, and a tenth of an inch in diameter.' Every ten or fifteen minutes he had to stop to take off a perfect anklet of them. Mr. Wallace found one in Malacca that had been having a rich feast close by his jugular vein. Borneo can boast of some monsters, where they are to be found seven or eight inches long.

As for roads, there seems little to choose between such a one as Mr. Wallace found in Bouru—a succession of mud-holes, knee-deep, the long grass six feet high meeting over the path—and such a one as is common apparently in Borneo. It goes up one side of a precipice and down the other, with occasional flights on a half-rotten bamboo, sometimes with a hand-rail, sometimes with none, over a fearful chasm, with a roaring torrent boiling and seething far below. More ordinary travelling, too, in a Malay carriage, has its disagreeables, if you are to be driven, as the Professor was, at full gallop round a bluff, the road so narrow that the outside wheels of the carriage were just on its outer edge, the precipice there being two hundred feet high.

After this, it seems hardly worth mentioning such trifles as the thunder-storms which visit these regions, sometimes at the rate of one a day, though a shower a fortnight long, without, apparently, an interval of five minutes, as sometimes occurs at Amboyna, must have a monotony about it that could easily be dispensed with. On the whole, our feeling is one of great gratitude to the heroes of Natural History, who can ride on a cayman like Waterton, make personal acquaintance with earthquakes like Professor Blackmore, venture among cannibals to supply our cabinets with butterflies like Mr. Wallace, and give us the excitement of reading their story by a cosy fireside, over a cup of tea in an English home. We can even sympathise with the captain whom Professor Bickmore mentions (he was a Cape

Cod man), who declared that the sand-hills on the outer side of Cape Cod were vastly more charming to him than the enchanting scenery of Java.

Yet, notwithstanding all these drawbacks—and they are many and serious ones—these islands are most lovely and enchanting. Coral gardens, guava brushwood, groves of nutmegs, gorgeous butterflies, birds of Paradise; what charms, indeed, are here! The first sight of a coral reef may be a disappointment, as it was to Mr. Jukes, who found it looking ‘simply like a half-drowned mass of dirty-brown sandstone, on which a few stunted corals had taken root:’ but further acquaintance is sure to bring with it wonder and satisfaction. Here is Mr. Jukes’s description of a reef he visited:—

‘In a small bight of the inner edge of this reef was a sheltered nook, where the extreme slope was well exposed, and where every coral was in full life and luxuriance. Smooth round masses of *mæandrina* and *astræa* were contrasted with delicate leaf-like and cup-shaped expansions of *explanaria*, and with an infinite variety of branching *madreporeæ* and *seriatoporeæ*, some with mere finger-shaped projections, others with large branching stems, and others again exhibiting an elegant assemblage of interlacing twigs, of the most delicate and exquisite workmanship. Their colours were unrivalled—vivid greens, contrasting with more sober browns and yellows, mingled with rich shades of purple, from pale pink to deep blue. Bright red, yellow, and peach-coloured *nulliporeæ* clothed those masses that were dead, mingled with beautiful pearly flasks of *eschara* and *retepora*, the latter looking like lace-work in ivory. In among the branches of the corals, like birds among trees, floated many beautiful fish, radiant with metallic greens or crimsons, or fantastically banded with black and yellow stripes. Patches of clear white sand were seen here and there for the floor, with dark hollows and recesses beneath overhanging masses and ledges. All these, seen through the clear crystal water, the ripple of which gave motion and quick play of light and shadow to the whole, formed a scene of the rarest beauty, and left nothing to be desired by the eye, either in elegance of form or brilliancy and harmony of colouring.’—vol. i., pp. 117, 118.

‘It was a sight to gaze at for hours,’ says Mr. Wallace, speaking of the harbour of Amboyna, ‘and no description can do justice to its surpassing beauty and interest.’—vol. i., p. 463.

Equally enthusiastic is Professor Bickmore (p. 123). Nor is he ever weary of enlarging on the beauty of the landscapes he met with in his travels. The magnificent scenery of Sumatra, the exquisite loveliness of Minahassá—the lotus-land of the East, and probably the most beautiful spot in the whole world—these, and many others, are painted in something at least of their colours in the Professor’s book.

Mr. Jukes gives us a description of a scene in Java :—

‘ All these features are imposing for their size and loftiness, and yet so delicately executed, so sharply chiselled or modelled as it were out of the earth, as at the same time to affect the mind with the solemnity of grandeur and the delight of beauty. But when these mountain steeps are clothed with endless woods of magnificent forest trees having lofty stems and widely-branching heads, and every glen is crowded with stately palms, drooping and elegant tree ferns, arching clusters of feathery bamboos, delicately-stemmed acacias, and broad-leaved plantains and bananas, all rising from piles and heaps of plants of lesser growth, ferns and creepers and succulent plants with huge round-lobed or variously-shaped leaves ; and when among these luxuriant woods, by the side of these falling waters, wind paths and alleys carpeted with short green turf, turning from dell to dell as if searching for the loveliest spots, with a fresh cool breeze rustling the leaves above, and a deep blue sky shining over all, against which, here and there, some tall grassy peak starts up above the loftiest heights of wood, I do not believe that more exquisite scenery ever rose before the imagination, even of a poet in his youthful dreams. The eye of the gazer becomes satiated with every form of earthly loveliness, and to me at least the valleys among these mountains of Java have ever since been the very type of beauty, the remembrance of which will, I hope, dwell with me as long as I exist.’—vol. ii. pp. 124, 125.

The want of energy in Eastern nations has almost become a proverb. There is, however, a perhaps sufficient explanation of it in Mr. Jukes’s experience of the influence the climate had upon himself. He had slight attacks of fever, but in about ten days was pronounced convalescent. ‘ But I no longer felt the same person ; languor and lassitude took possession both of mind and body, and I seemed to pass at once into the state of those who have long been resident in hot countries, and to have acquired all their listlessness and indifference, want of energy, and want of curiosity. Neither was this state of mind transient. I could not overcome it for two or three months after we left Java, and it was not till I had enjoyed the fresh sea-breezes of Torres Strait for a month or two that I again felt myself fit for active exertion, or my former love of, and delight in, explorations and excursions revived. I now, for the first time, knew how to account for and excuse what at first seemed to me the blameable inertness, indolence, and indifference to anything beyond the comfort of the passing hour—the want of energy and action so almost universally characteristic of the resident in hot climates.’

But there is little inducement to labour in lands where idleness is ‘ encouraged from their earliest childhood by the unflinching and unsparing manner in which Nature supplies their limited

wants.' Half an hour of daylight is in some places time enough to build a house in; and Mr. Jukes tells us that in Java he never met with a single beggar, or any one with ragged clothing, or of an emaciated or poverty-stricken appearance. In Batchian a man's wages are 3*d.* a day, with the privilege of finding his own provisions. The very abundance of supply, however, is at times of questionable benefit. Mr. Wallace told the British Association at Cambridge in 1862 what he tells us again in his book, that in New Guinea the trunk of a sago tree twenty feet long and five feet in circumference can be with only a few days labour converted into food. A good-sized tree will produce thirty bundles of raw sago, weighing about thirty pounds a bundle, and when baked yielding about sixty cakes of three to the pound. Two of these cakes are a meal for a man, or about five cakes a day; and as a tree produces 1800 cakes, it gives food for one man about a year. As it takes only about ten days to prepare a sago tree, a man has the rest of the year entirely at his own disposal, which he spends usually in sheer idleness, and consequently has a more miserable hut and scantier amount of clothing than his neighbours who have to exert themselves more to procure their food. Even if he has to buy a sago tree, he can obtain one for about 7*s.* 6*d.*, and as labour in Ceram is 5*d.* a day, the total cost of a year's food for one man is about 12*s.*

Professor Bickmore had one very definite object in his expedition. In the year 1705 a very valuable work had been published on the Shells of Amboyna. The author was George Everard Rumpf, a native of a small town in Hesse Cassel, who, after serving for some years in the merchant navy of the Dutch East India service, settled at Amboyna, where he died in 1693, at the age of 67. 'It was my desire,' says the Professor, 'not only to obtain the same shells that Rumphius figures, but to procure them from the same points and bays, so that there could be no doubt about the identity of my specimens with his drawings.'

It is enough to fill collectors like ourselves with envy to hear about the rich treasures Professor Bickmore was enabled to secure, and enough to make a dealer so enterprising as Mr. Damon, of Weymouth, to set off at once on a similar expedition. 'The village of Amet,' he tells us, 'is one of the best places in the whole Moluccas to gather shells. The platform of coral which begirts the island extends out here nearly two English miles from high water level to where the heavy swell breaks along its outer edge; and all this flat area is either bare at low tide, or only covered to the depth of a few inches by small pools.' At one time it is a cone, 'covered with mottled bands of black and salmon colour, which once commanded fabulous prices in Europe,

and is now generally regarded by the natives as the most valuable shell obtained-in these seas.' It is not easy to identify the species from this description, but at the sale of the famous Dennison collection in 1865, no cones from Malacca (*C. Omaicus*, *C. Malaccanus*, &c.) fetched prices approaching in any degree to the 42*l.* fetched by the *Conus gloria maris* from the Philippine Islands, of which such a magnificent specimen, from the Stainforth collection, is represented on the title page of the first volume of Reeve's '*Conchologia Iconica.*' At another time it is a living *Terebellum*, confined again to one particular locality. In one place he secures the *Strombus latissimus*, a shell he had long been hoping to see; at another, one of the rarest of shells living in all these seas, the *Rostellaria rectirostris*. 'It is so seldom found, that a pair is frequently sold here for ten guilders, four Mexican dollars.' So successful, indeed, were his researches, that after spending only a couple of months at Amboyna, he not only collected all the shells figured in Rumphius's '*Rariteit-Kamer*' which he had come to seek, but more than twice as many species besides. Still that he could in that short time have exhausted the mollusca of the Spice Islands is incredible. When we remember the many years that Mr. Cuming devoted to dredging, diving, wading, digging, climbing, and other methods of obtaining shells in the Philippine Islands, and forming the rich collection now so happily secured for our national museum, we can well imagine that abundance of materials have been left by Professor Bickmore for future discoveries. In one instance, at least, he is obliged to confess to comparative failure. The Resident of the Spice Islands shewed him in his own cabinet 'two magnificent specimens of that costly wentletrap, the *Scalaria pretiosa*, for which large sums were once paid in Europe. It was the only kind of shell which I saw or heard of during my long travels among these islands of which I failed to obtain at least one good specimen.' It used to be worth forty guineas, but may be had now for a few shillings. One *Scalaria*, however, *S. magnifica*, fetched 4*l.* at the Dennison sale. The excessive prices which shells used once to fetch are no longer obtainable now; only three shells in the Dennison collection, besides the *Conus gloria maris* already mentioned, brought over 20*l.* A *Conus cedo-nulli* was sold for 22*l.*, the *Cypræa princeps*, 40*l.*; and *Cypræa guttata*, 42*l.* The *Carinaria* that once fetched 120*l.* may be had for a shilling; though the glorious species, *C. vitrea*, still brings its ten guineas. His grand prize, however, was a living specimen of *Nautilus Pompilius*. Rumphius seems to have been well acquainted with the animal, for though his figure is rude and imperfect enough, his

description is very fairly accurate. But in modern times specimens with the animal were of extreme rarity. The first that was brought to this country was captured by Mr. George Bennett in 1829 off the island of Erromanga, one of the New Hebrides group, and is now preserved in the museum of the Royal College of Surgeons in London. It was this specimen from which Professor Owen wrote his memoir, which Johnstone, in his 'Introduction to Conchology,' calls 'one of the best and most beautiful monographs in comparative anatomy.' A careful reduction of the drawing of the animal will be found in the admirable 'Handbook of the Mollusca,' by the late S. P. Woodward, which ought to be compared with the marvellous figure given by Denys de Montfort, extremely unlike anything in the animal kingdom, but bearing a striking resemblance to the fire-works Mr. Briggs sees, in one of Leech's inimitable sketches, in a pheasant that gets up at his feet.

Professor Bickmore tells us that Professor Owen 'worked, as he himself described it to me, with a dissecting knife in one hand and a pencil in the other. So little escaped his pen and pencil, that very little information has been added by later dissections.' With regard to the obtaining his own specimens, he says:—

'I was so anxious to secure one of these rare animals that I felt that if I should obtain one, and a few more common species, I could feel that my long journey had been far from fruitless. Only the second day after my arrival, to my inexpressible delight, a native brought me one still living. Seeing how highly I prized it, he began by asking ten guilders (four Mexican dollars) for it, but finally concluded to part with it for two guilders (less than one Mexican dollar), though I should certainly have paid him fifty if I could not have obtained it for a less price. It had been taken in this way: the natives throughout the Archipelago rarely fish with a hook and line as we do, but where the water is too deep to build a weir, they use instead a *bubu*, or barrel of open basket-work of bamboo. Each end of this barrel is an inverted cone, with a small opening at its apex. Pieces of fish and other bait are suspended from within, and the *bubu* is then sunk on the clear patches of sand on a coral reef, or more commonly out where the water is from 20 to 50 fathoms deep. No line is attached to those on the reefs, but they are taken up with a gaff. Those in deep water are buoyed by a cord and a long bamboo, to one end of which a stick is fastened in a vertical position, and to this is attached a piece of palm-leaf for a flag, to make it more conspicuous. In this case it happened that one of these *bubus* was washed off into deeper water than usual, and the nautilus chanced to crawl through the opening in one of the cones to get at the bait within. If the opening had not been much larger than usual it could not possibly have got in. It was at once placed in a can containing

strong arrack. I then offered twice as much for a duplicate specimen, and hundreds of natives tried and tried, but in vain, to procure another during the five months I was in those seas. They are so rare even there, that a gentleman who had made large collections of shells assured me that I ought not to expect to obtain another if I were to remain at Amboyna three years. . . . The dead shells are so abundant on these islands that they can be purchased in any quantity at from four to ten cents apiece.—pp. 135, 136.

Birds will have a fuller notice when we come to Mr. Wallace's book. Meanwhile we may mention one species described both by Mr. Jukes and Professor Bickmore—the *Megapodius*. This bird is chiefly remarkable for the immense mounds it constructs in which to lay its eggs, and which are very abundant in the islands about Endeavour Strait and round Cape York, as well as on the neighbouring mainland. They are formed of sticks, dead leaves, stones and earth. One measured by Mr. Jukes was 150 feet in circumference, the slope of the sides 18 to 24 feet high, and the perpendicular height 10 or 12 feet. This, however, is far beyond the ordinary size. The eggs, as large as those of a swan, are considered a great delicacy. These were no doubt the large nests that Captain Cook and Flinders saw, and which Professor Hitchcock imagined might be the *nests of the Dinornis*.

We may here also mention that great dainty which holds among Chinese epicures the place that turtle-soup does in a civic feast in our own metropolis—birds'-nest soup. About 242,000 lbs. of these nests, averaging twenty shillings a pound, are imported into China every year from the Indian Archipelago. The best samples fetch as much as 6*l.* per pound. Mr. Jukes tells us that it was at the dinner-table of the Sultan of Bankalang, Madura, who makes about 4000*l.* a year by his caves, he first tasted this soup, the excellence of which he declares to be by no means due to the birds'-nests, which are quite an imaginary dainty, and only perform the part of isinglass. These nests are made from a sea-weed, a species of *Gelidium*, allied to the *Chondrus crispus*, or Carrageen moss of our own shores, and from which a harmless sort of blanc mange can be made. The labour and danger of collecting them is described very graphically in Crawford's 'Eastern Archipelago':—

'The nests are obtained in deep and damp caves, and are most esteemed if taken before the birds have laid their eggs. The coarsest are those collected after the young have been fledged. The finest nests are the whitest; that is, those taken before they are defiled by the young birds. They are taken twice a year, and if regularly collected and no unusual injury offered to the caverns, the produce is very equal, and the harvest very little, if at all, improved by being

left unmolested for a year or two. Some of the caverns are extremely difficult of access, and the nests can only be collected by persons accustomed from their youth to the office. In one place the caves are only to be approached by a perpendicular descent of many hundred feet by ladders of bamboo and rattan, over a sea rolling violently against the rocks. When the mouth of the cavern is attained, the perilous office of taking the nests must often be performed by torch-light, by penetrating into the recesses of the rock, where the slightest trip would be instantly fatal to the adventurers, who see nothing below them but the turbulent surf making its way into the chasms of the rock.'

It reminds one of the thrilling stories told of the bird-catchers of St. Kilda.

The Mammoth Cave of Kentucky is famous, amongst other things, for having a considerable fauna, either destitute of eyes altogether, or with the organs of vision in so rudimentary a state as to be practically useless. Among these are two kinds of bats, two rats (one found at a distance of 7 miles from the entrance), moles, fishes, spiders, beetles, crustacea, and several kinds of infusoria. In Europe, besides some fresh-water shrimps in our own country, we have that curious inhabitant of caves in Illyria, the *Proteus anguinus*—a true amphibian, possessing both branchiæ and lungs; and the Russian blind rat (*Asphalax typhlus*), about which the people of the Ukraine have a belief that the hand that has suffocated one of these creatures has the virtue of curing the king's evil. All these are destitute of anything that can be called eyes. Darwin's explanation of this want of vision is thus given in his 'Origin of Species':—

'On my view we must suppose that American animals, having ordinary powers of vision, slowly migrated by successive generations from the outer world into the deeper and deeper recesses of the Kentucky caves, as did European animals into the caves of Europe. We have some evidence of this gradation of habit; for, as Schiödte remarks, animals not far remote from ordinary forms prepare the transition from light to darkness. Next follow those that are constructed for twilight, and last of all, those destined for total darkness. By the time that an animal has reached, after numberless generations, the deepest recesses, disuse will, on this view, have more or less perfectly obliterated its eyes, and natural selection will often have effected other changes, such as an increase in the length of the antennæ or palpi, as a compensation for blindness.'—p. 137.

It is, however, a very remarkable circumstance, that in a large cave near Bua, in Sumatra, in a rivulet, the temperature of which was 92° Fah., there are found fishes in considerable numbers, about 4 inches long, which all have 'eyes that were

apparently well formed, though this place seemed to us absolutely cut off from daylight.'

Of the vegetable kingdom we have already mentioned one very important member, the sago-tree. But the first object that would be noticed on most of the islands is the tall, graceful, cocoa-nut palm, 'the prince of palms both for beauty and utility.' Here in England we have no idea of what the fruit is like, in perfection. In the condition in which it reaches us, the Malays would only value it for its oil. One of its valuable qualities is thus described by Professor Bickmore:—

'The cool clear water which the young nuts contain is a most refreshing drink in these hot climates, far preferable, according to my taste, to the warm, muddy water found in all low lands within the tropics. Especially can one appreciate it, when, exposed to the burning sun on a low coral island, he longs for a single draught from the cold sparkling streams among his native New England hills. He looks around him and realizes that he is surrounded by the salt waters of the ocean—then one of his dark attendants, divining his desire, climbs the smooth trunk of a lofty palm, and brings down, apparently from the sky, a nectar delicious enough for the gods.'—pp. 83, 84.

So important is this tree, that the Dutch officials are required to find out how many there are in their respective districts. In 1861, there were, in Java and Madura, nearly twenty millions of these trees, or more than three to every two natives. On good soil a tree will produce from eighty to one hundred nuts, and as it blossoms every five or six weeks, fruit can always be found on it in every stage of ripeness. The uses to which the different parts of the tree are put are innumerable.

Next in importance is the banana-tree, different specimens of which differ as much one from another as apples do amongst ourselves. A good banana must be really excellent, filled as it is with delicious juices: it melts in the mouth like a delicately-flavoured cream.

Again, there is the breadfruit-tree, the chief sustenance of the inhabitants of the Society Islands and other parts of the South Sea. Mr. Wallace first met with it at Amboyna:—

'Though it grows in several other parts of the Archipelago, it is nowhere abundant, and the season for it only lasts a short time. It is baked entire in the hot embers, and the inside scooped out with a spoon. I compared it to Yorkshire pudding; Charles Allen said it was like mashed potatoes and milk. It is generally about the size of a melon, a little fibrous towards the centre, but everywhere else quite smooth and puddingy, something in consistence between yeast-dumplings and batter-pudding. We sometimes made curry or stew of it, or fried it in alices; but it is no way so good as simply baked.

It may be eaten sweet or savoury. With meat and gravy it is a vegetable superior to any I know, either in temperate or tropical countries. With sugar, milk, butter, or treacle, it is a delicious pudding, having a very slight and delicate but characteristic flavour, which, like that of good bread and potatoes, one never gets tired of. The reason why it is comparatively scarce is, that it is a fruit of which the seeds are entirely aborted by cultivation, and the tree can therefore only be propagated by cuttings.'—vol. i. pp. 476, 477.

Of the many delicious fruits found in the Archipelago, Professor Bickmore thinks that the Mangostin ought unquestionably to be considered the first. Marsden, too, thinks it perhaps the most delicious fruit in the world. Though it flourishes in the Philippines, into which it has been introduced, all attempts at domesticating it on the continent of India, as well as in the West India Islands, have failed entirely. There seems to be no more explanation of this curious fact than of our great English conchologist, Mr. J. G. Jeffreys', unsuccessful attempt at introducing the *Helix Pisana* from Tenby to Swansea.

But the fruit which is preferred by the natives of the islands in the Pacific above all others is the Durian. Its smell, however, is generally enough for Europeans. Professor Bickmore says it has an odour of putrid animal matter (Rumphius says rotten onions) so strong that a single fruit is enough to infect the air in a large house. 'In the season for this fruit the whole atmosphere in the native villages is filled with this detestable odour.' Mr. Jukes succeeded in getting over his repugnance at its scent, and then really liked the fruit. 'Its flavour, however, is very peculiar—something like rich custard and boiled onions mixed together.' Mr. Crawford compares it to fresh cream and filberts. Mr. Wallace thinks that 'a rich butter-like custard, highly flavoured with almonds, gives the best general idea of it, but intermingled with it come wafts of flavour that call to mind cream-cheese, onion sauce, brown sherry, and other incongruities. There is a rich glutinous smoothness in the pulp which nothing else possesses, but which adds to its delicacy. It is neither acid, nor sweet, nor juicy, yet one feels the want of none of those qualities, for it is perfect as it is. It produces no nausea or other bad effect, and the more you eat of it the less you feel inclined to stop. In fact, to eat Durians is a new sensation worth a voyage to the East to experience.' To his mind, the Durian is the king, and the orange the queen of fruits.

With respect to all these delicious fruits Mr. Wallace reminds us that they are as much cultivated productions as apples and peaches with ourselves, and that their wild prototypes, when

found, are generally either tasteless or uneatable, and that there are no really wild fruits in the tropics to be compared with our blackberries and whortleberries. 'The kanary-nut may be considered equal to a hazel-nut, but I have met with nothing else superior to our crabs, our haws, beech-nuts, wild plums, and acorns: fruits which would be highly esteemed by the natives of these islands, and would form an important part of their sustenance.'

Of the products of the Spice Islands, we must first of all mention the nutmeg. At the time when it is gathered—the bright vermilion 'mace' surrounding the black polished nut within—it is 'probably by far the most beautiful fruit in the whole vegetable kingdom.' It is principally gathered twice a year, September and June, and the trees bear abundantly season after season. The April gathering, which some writers tell us is the most productive, is not mentioned by Professor Bickmore at all. An average crop for the last twenty years has been about 580,000 Amsterdam pounds of nuts, and 137,000 pounds of mace. The trees may be estimated, in round numbers, at 450,000, of which only two-thirds bear. The Dutch, however, it appears, are inclined to give up their monopoly, as the profits do not cover the expenses.

The clove, Rumphius believed, could only grow in the Moluccas. Besides other parts of the Archipelago, however, into which it has been introduced, it flourishes at present in the West Indies, Guiana, &c. In Amboyna it is not expected to bear fruit before its twelfth or fifteenth year, and to cease yielding when it is seventy-five years old. The annual produce of a good tree is about four pounds and a half, and the yearly crop on Amboyna, Haruku, Saparua, and Nusalaut, the only islands where the tree is now cultivated, is 350,000 Amsterdam pounds. If, however, we believe Pigafetta, it used to produce seventeen times this quantity in former times. The natives never use it as a condiment themselves.

One more tree must be mentioned, the Pinang or Betel-nut Palm, which Dr. Roxburgh calls the most beautiful palm in India, and which is held in high estimation both by Malays and Papuans. The nut, which resembles a nutmeg,

'is chewed with a green leaf of the *siri*, *Piper betel*, which is raised only for this purpose, and such great quantities of it are consumed in this way that large plantations are seen in Java solely devoted to its culture. The mode of preparing this morsel for use is very simple: a small quantity of lime as large as a pea is placed on a piece of the nut and enclosed in a leaf of *siri*. The roll is taken between the thumb

and forefinger and rubbed violently against the front gums, while the teeth are closed firmly and the lips opened widely. It is now chewed for a moment, and then held between the teeth and lips so as to partly protrude from the mouth. A profusion of red brick-coloured saliva now pours out of each corner of the mouth while the man is exerting himself at his oar or hurrying along under a heavy load. When he is rich enough to enjoy tobacco, a small piece of that luxury is held with the siri between the lips and teeth. The leaf of the tobacco is cut so fine that it exactly resembles the "fine cut" of civilised lands, and long threads of the fibrous oakum-like substance are always seen hanging out of the mouths of the natives and completing their disgusting appearance. This revolting habit prevails not only among the men but also among the women, and whenever a number come together to gossip, as in other countries, a box containing the necessary articles is always seen near by, and a tall urn-shaped spit-box of brass is either in the midst of the circle, or passing from one to another, that each may free her mouth from surplus saliva. Whenever one native calls on another, or a stranger is received from abroad, invariably the first article that is offered him is the siri-box.—*Bickmore*, pp. 181, 182.

Here, then, we take leave of Professor Bickmore, sorry to have to say good-bye to so pleasant a companion, but with hopes of meeting him again when he gives us the account of those more continued dangers and yet greater hardships which he endured in the year he spent in the empire of China.

The interest of Mr. Wallace's charming volumes is somewhat diminished by two circumstances, first, that it is now more than six years ago since he returned to England from the Malay Archipelago, and, secondly, that he has himself anticipated much of the information he gives us by his contributions at various times to the British Association, the 'Annals of Natural History,' the 'Linnæan Transactions,' and other scientific journals. It is, however, a great advantage to have the *resumé* of his researches in so compact and convenient a form.

Mr. Wallace himself answers the question that naturally suggests itself to us, why he has not given his volumes to the world before this. When he reached England, in the spring of 1862, he found himself surrounded by a room full of packing cases, which he had sent home from time to time. A large proportion of them he had not seen for years, and, as he was then in a weak state of health, the business of unpacking, sorting, and arranging such a mass of specimens proceeded very slowly. But there was another point about which he was specially engaged, the working out of some of the more interesting problems of variation and geographical distribution: and until this was accomplished he determined not to attempt to

publish his travels. The materials for his study were as follows:—

310	specimens of	Mammalia.
100	"	Reptiles.
8,050	"	Birds.
7,500	"	Shells.
13,100	"	Lepidoptera.
83,200	"	Coleoptera.
13,400	"	Other Insects.

125,660 specimens of natural history.

In accordance with the views already expressed, Mr. Wallace tells us that his object in visiting the Archipelago, was not simply to make collections, but to obtain evidence of changes that have taken place on the earth, without leaving any geological record. 'It is certainly a wonderful and unexpected fact, that an accurate knowledge of the distribution of birds and insects should enable us to map out lands and continents which disappeared beneath the ocean long before the earliest traditions of the human race.' And he considers himself to have been rewarded in this matter with great success, so that he is 'enabled to trace out with some probability the past changes which one of the most interesting parts of the earth has undergone.'

We find many interesting notices in these volumes about the flora of the Archipelago in addition to what we have given already. One observation of considerable value in certain geological speculations is about tree ferns. Humboldt, in his 'Aspects of Nature,' tells us that between the tropics the proper zone of these plants is from about 3200 to 5330 feet above the level of the sea: and that in South America and the Mexican highlands they seldom descend lower towards the plains than 1280 feet, the mean temperature being between 70° and 64° Fahr. In Borneo, however, in the Aru Islands and on the banks of the Amazon, Mr. Wallace found them flourishing *at the level of the sea*, and his conclusion is that in such localities as Java, India, Jamaica, and Brazil, where they are not so found, the reason is that the cultivation of the plains and lowlands has destroyed the indigenous vegetation. It was on the Aru Islands that Mr. Wallace first saw these plants in perfection. 'All I had hitherto met with were slender species, not more than twelve feet high, and they gave not the least idea of the supreme beauty of trees bearing their elegant heads of fronds more than thirty feet in the air, like those which were plentifully scattered

about this forest. There is nothing in tropical vegetation so perfectly beautiful.'

If there are no cocoa-nuts at hand to quench one's thirst, that kind office may be performed by that curious plant—our hot-house specimens of which give so little notion of its size and beauty—the Pitcher plant. Each pitcher contains about a pint of water, which, though full of insects and otherwise uninviting, was found very palatable. In Borneo they reach their highest development.

'Every mountain-top abounds with them, running along the ground, or climbing over shrubs and stunted trees; their elegant pitchers hanging in every direction. Some of these are long and slender, resembling in form the beautiful Philippine lace-sponge (*Euplectella*) which has now become so common: others are broad and short. Their colours are green, variously tinted and mottled with red or purple. The finest yet known were obtained on the summit of Kini-balou, in North-West Borneo. One of the broad sort, *Nepenthes rajah*, will hold two quarts of water in its pitcher. Another, *Nepenthes Edwardsiana*, has a narrow pitcher, twenty inches long; while the plant itself grows to a length of twenty feet.'—vol. i. p. 127.

The Banyan-tree, with its multitude of stems, is generally regarded as perhaps the most curious production of the vegetable world, but a tree figured by Mr. Wallace, at p. 130 of his first volume, is more bizarre still. It seems to have begun growing in mid-air, and to have sent out from the same point wide-spreading branches above, and a complicated pyramid of roots descending for seventy or eighty feet to the ground below, and so spreading on every side that one can stand in the very centre with the trunk of the tree immediately overhead.

'I believe,' says Mr. Wallace, 'that they originate as parasites from seeds carried by birds, and dropped in the fork of some lofty tree. Hence descend aerial roots, clasping and ultimately destroying the supporting tree, which is in time entirely replaced by the humble plant which was at first dependent upon it. Thus we have an actual struggle for life in the vegetable kingdom, not less fatal to the vanquished than the struggles among animals, which we can so much more easily observe and understand. The advantage of quicker access to light and warmth and air, which is gained in one way by climbing plants, is here obtained by a forest tree, which has the means of starting in life at an elevation which others can only attain after many years of growth, and then only when the fall of some other tree has made room for them. Thus it is that in the warm and moist and equable climate of the tropics each available station is seized upon, and becomes the means of developing new forms of life especially adapted to occupy it.'—vol. i. p. 131.

Now and then there is found in the Archipelago a flora,

with very curious relations to that of Europe. On the extinct cone of Pangerongo, in Java, for instance, Mr. Motley found twenty genera of European plants. A few of the smaller plants (*Plantago major* and *lanceolata*, *Sonchus oleraceus*, and *Artemisia vulgaris*), are identical with European species. Mr. Darwin, as we are reminded, explains this case, as he does the analogous ones of the Himalayas, Central India and Abyssinia, and the still more striking cases of the higher portions of the Alps and the White Mountains of America, where the plants are absolutely identical with those of Lapland and Labrador, by a depression of temperature, during the glacial period, which allowed a few north-temperate plants to cross the Equator (by the most elevated routes), and to reach the Antarctic regions, where they are now found. Java in those days must be supposed to have been connected with the mainland of Asia, a fact which on other considerations appears highly probable.

But what of the gorgeous flowers from these lands of romance and beauty? Where are they? Mr. Wallace, somewhat rudely, dispels our notions about them.

'The reader who is familiar with tropical nature only through the medium of books and botanical gardens will picture to himself in such a spot many other natural beauties. He will think that I have unaccountably forgotten to mention the brilliant flowers, which, in gorgeous masses of crimson, gold, or azure, must spangle these verdant precipices, hang over the cascade, and adorn the margin of the mountain stream. But what is the reality? In vain did I gaze over these vast walls of verdure, among the pendant creepers and bushy shrubs, all around the cascade, on the river's bank, or in the deep caverns and gloomy fissures; not one single spot of bright colour could be seen, not one single tree, or bush, or creeper bore a flower sufficiently conspicuous to form an object in the landscape. In every direction the eye rested on green foliage and mottled rock. There was infinite variety in the colour and aspect of the foliage, there was grandeur in the rocky masses and in the exuberant luxuriance of the vegetation, but there was no brilliancy of colour, none of those bright flowers and gorgeous masses of blossom, so generally considered to be everywhere present in the tropics. I have here given an accurate sketch of a luxuriant tropical scene, as noted down on the spot, and its general characteristics as regards colour have been so often repeated, both in South America and over many thousand miles in the Eastern tropics, that I am driven to conclude that it represents the general aspect of nature in the equatorial (that is, the most tropical) parts of the tropical regions. How is it, then, that the descriptions of travellers generally give a very different idea? and where, it may be asked, are the glorious flowers that we know do exist in the tropics? These questions can be easily answered. The fine tropical flowering-plants cultivated in our hothouses have been culled from the most varied regions, and therefore give a most erro-

neous idea of their abundance in any one region. Many of them are very rare, others extremely local, while a considerable number inhabit the more arid regions of Africa and India, in which tropical vegetation does not exhibit itself in its usual luxuriance. Fine and varied foliage, rather than gay flowers, is more characteristic of those parts where tropical vegetation attains its highest development, and in such districts each kind of flower seldom lasts in perfection more than a few weeks, or sometimes a few days. In every locality a lengthened residence will show an abundance of magnificent and gaily-blossomed plants, but they have to be sought for, and are rarely at any one time or place so abundant as to form a perceptible feature in the landscape. But it has been the custom of travellers to describe and group together all the fine plants they have met with during a long journey, and thus produce the effect of a gay and flower-painted landscape. They have rarely studied and described individual scenes where vegetation was most luxuriant and beautiful, and fairly stated what effect was produced in them by flowers. I have done so frequently, and the result of these examinations has convinced me that the bright colours of flowers have a much greater influence on the general aspect of nature in temperate than in tropical climates. During twelve years spent amid the grandest tropical vegetation, I have seen nothing comparable to the effect produced on our landscapes by gorse, broom, heather, wild hyacinths, hawthorns, purple orchises, and buttercups.'—vol. i. pp. 371-3.

In entomology, to which Mr. Wallace appears to have given especial attention, we have so much varied and interesting information that we can make only a few selections. The abundance of insects in particular localities may be seen from Mr. Wallace's success in Kaióá. He says it was a glorious spot, and one that will always live in his memory as exhibiting the insect life of the tropics in unexampled luxuriance. On October 15, 1858, he took there thirty-three species of beetles; on the 16th, seventy; on the 17th, forty-seven; on the 18th, forty; and on the 19th, fifty-six: in all, about 100 species, of which forty were new. Equally productive was Dorey in New Guinea. One day he brought home no less than ninety-five distinct kinds of beetles, a larger number than he has ever obtained in one day before or since:—

'It was a fine hot day, and I devoted it to a search among dead leaves, beating foliage, and hunting under rotten bark, in all the best stations I had discovered during my walks. I was out from ten in the morning till three in the afternoon, and it took me six hours' work at home to pin and set out all the specimens, and to separate the species. Although I had already been working this spot daily for two months and a half, and had obtained over 800 species of Coleoptera, this day's work added 32 new ones. Even on the last day I went out, I obtained 16 new species: so that, although I collected over a thousand

distinct sorts of beetles in a space not much exceeding a square mile during the three months of my residence at Dorey, I cannot believe that this represents one-half the species really inhabiting the same spot, or a fourth of what might be obtained in an area extending twenty miles in each direction.'—vol. ii. pp. 326, 327.

The finest collection of moths Mr. Wallace made was on a mountain, densely clothed with forest, near Saráwak. As soon as it got dark he placed his lamp against the wall, and with pins, insect-forceps, net and collecting-boxes, waited for his sport. Sometimes during the whole evening only one solitary moth would come, while on other nights they came in literally by thousands, keeping him hard at work catching and pinning till past midnight. These good nights, however, were few. During the four weeks he was there, from December 13, 1855, to January 18, 1856, though he obtained 1386 specimens, he had only four really good nights, the best being Jan. 11, when he captured no less than 260, the night being very dark, and raining heavily. The last day of December, when the night was much of the same character, produced 200 specimens, belonging to 130 species. His success he attributes partly to his being in a cottage with a low-boarded and whitewashed verandah, so that the moths, when once inside, could not conceal themselves as in a dark, palm-thatched house, with a lofty roof; in close recesses every moth was lost the instant it entered.

Nowhere in the Archipelago do butterflies occur in the numbers they do in the forests of South America, though the western islands (Java, Borneo, &c.) are much more productive than the eastern. One glorious specimen was brought to Mr. Wallace by a Javanese boy who had caught it in his fingers as it was sitting with wings erect, sucking up the liquid from a muddy spot by the road-side. It proved to be the rare and curious *Charaxes Kadenii*, remarkable for having on each hind wing two curved tails, like a pair of callipers. It was the only specimen Mr. Wallace ever saw, and is still the only representative of its kind in English collections. In Sumatra he procured the splendid *Papilio memnon*, of a deep black colour, dotted over with lines and groups of scales of a clear ashy blue, and with wings five inches in expanse. In Amboyna he met with the shining blue *Papilio Ulysses*, 'one of the most tropical-looking insects the naturalist can gaze upon;' but it was very difficult to obtain specimens in fine condition. Some of the finest butterflies in the world are found in the rocky forests of Celebes. At one place Mr. Wallace visited,

'When the sun shone hottest about noon, the moist beach of the pool presented a beautiful sight, being dotted with groups of gay but-

terflies—orange, yellow, white, blue, and green—which, on being disturbed, rose into the air by hundreds, forming clouds of variegated colours.'—vol. i. p. 370.

Amongst them were the magnificent *Papilio androcles*, one of the largest and rarest known swallow-tails; and another of the same group, the *Papilio blumei*, one of the most gorgeous of butterflies: it is a green and gold, with azure-blue spoon-shaped tails. But 'the largest, the most perfect, and the most beautiful of butterflies' are the *Ornithoptera*. Three species of this gorgeous group, whose wings have an expanse of from seven to nine inches, are found in the Moluccas. Indeed, 'there is perhaps no island in the world so small as Amboyna, where so many grand insects are to be found.' In the Aru Islands Mr. Wallace captured *O. poseidon*, and gazed as he took it out of his net in admiration at the velvet black and brilliant green of its wings, its golden body and crimson breast. The village of Dobbo, he tells us, held that evening at least one contented man. Another grand capture of a variety, *O. remus*, was made in Celebes. The groundwork of this superb insect is a rich shining bronzy black, the lower wings delicately grained with white, and bordered by a row of large spots of the most brilliant satiny yellow. The body is marked with shaded spots of white, yellow, and fiery orange, while the head and thorax are intense black. On the under side the lower wings are satiny white, with the marginal spots half black and half yellow. At Batchian he met with another species, *O. cresus*, one of the most gorgeously-coloured butterflies in the world. The wings are velvety black and fiery orange, the latter colour replacing the green of the allied species.

'The beauty and brilliancy of this insect are indescribable, and none but a naturalist can understand the intense excitement I experienced when I at length captured it. On taking it out of my net and opening the glorious wings, my heart began to beat violently, the blood rushed to my head, and I felt much more like fainting than I have done when in apprehension of immediate death. I had a headache the rest of the day, so great was the excitement produced by what will appear to most people a very inadequate cause.'—vol. ii. p. 51.

Few, however, of these gorgeous creatures will compare with the Bornean species, *O. Brookeana*. It is a deep velvety black, with a curved band of spots of a brilliant metallic-green colour extending across the wings from tip to tip, each spot being shaped exactly like a small triangular feather, and having very much the effect of a row of the wing coverts of the Mexican trogon laid upon black velvet. The only other marks are a

broad neck-collar of vivid crimson, and a few delicate white touches on the outer margins of the hind wings. Though several specimens have now reached England, they are all males, the female as yet being altogether unknown.

Grand, however, as this noble creature is, even it, to our mind, bears no comparison with that flashing, dazzling beauty from Santa Fe da Bogota, the *Morpho cypris*.

In Borneo Mr. Wallace met with a very curious reptile, a species of tree frog. The toes of this creature are very long, and webbed to their very extremity, offering, when expanded, a surface much larger than the body; the webs apparently serving the same purpose as the 'wings' of *Draco volans*, that of imperfect flight. 'This is, I believe, the first instance known of a "flying frog;" and it is very interesting to Darwinians, as showing that the variability of the toes, which have been already modified for purposes of swimming and adhesive climbing, have been taken advantage of to enable an allied species to pass through the air like the flying lizard.' Another creature possessing similar powers, the limbs being connected with a bat-like membrane, is the flying lemur. Mr. Wallace saw one in Sumatra glide through the air from a tree to another which was seventy yards distant, the amount of descent being not more than thirty-five or forty feet, or less than one in five.

Birds occupy a considerable portion of Mr. Wallace's book. The Molucca islands alone supply no less than 265 species, 192 of them being land birds. Our author seems to have been, on the whole, wonderfully fortunate in his shooting; and he is never weary of enlarging on the great beauty of many of his specimens. There is, for instance, the gorgeous little minivet fly-catcher, which looks like a flame of fire as it flutters among the branches; the beautiful little violet and orange kingfisher, and the pretty Australian bee-eater, 'one of the most graceful and interesting objects a naturalist can see for the first time.' Handsome woodpeckers and gay kingfishers, green and brown cuckoos with velvety-red faces and green beaks, red-breasted doves and metallic honey suckers, were brought in day after day, and kept Mr. Wallace in a continual state of pleasurable excitement. One strange bird he obtained in Sumatra—a large hornbill, of which he secured both the male and female, together with a young one. This, he says, was a most curious object, as large as a pigeon, but without a particle of plumage on any part of it. It was exceedingly plump and soft, and with a semi-transparent skin, so that it looked more like a bag of jelly, with head and feet stuck on, than like a real bird. The male has a most extraordinary habit of plastering up the female with her egg, and

feeding her during the whole time of incubation, and till the young one is fledged. 'This is common to several of the large hornbills, and is one of those strange facts in natural history which are "stranger than fiction."'

But the group of birds about which our interest is most deeply excited is that of the birds of paradise. Strange stories used to be told and believed of them in olden times. They were said to have no feet, and consequently to pass their life in sailing through the air, their eggs being hatched in a natural cavity in the back of the male. They fed on dew and vapour, and their only rest was suspending themselves on trees by the two elongated feathers which are so conspicuous in many of the species. Their plumes were thought to give to those that wore them a charmed life, so that they could venture even where the battle raged most fiercely and fear no evil. Further knowledge has of course dispelled these imaginations. Their having no legs was simply owing to the natives of New Guinea always cutting them off whilst preparing the skins; and the other stories about them are found equally apocryphal. Mr. Wallace describes no fewer than eighteen species, eleven of which are found in New Guinea, eight of them being peculiar to it, and to the hardly separated island of Salwatty. Their food consists of fruits and insects, especially small figs, grasshoppers, locusts, cockroaches, and caterpillars. Nothing seems to be known either about their nests or eggs. In the great bird of paradise,

'the long plummy tufts of golden orange feathers spring from the sides beneath each wing, and, when the bird is in repose, are partly concealed by them. At the time of its excitement, however, the wings are raised vertically over the back; the head is bent down and stretched out, and the long plumes are raised up and expanded, till they form two magnificent golden fans, striped with deep red at the base, and fading off into the pale-brown tint of the finely-divided and softly-waving points. The whole bird is then overshadowed by them, the crouching body, yellow head and emerald-green throat forming but the foundation and setting to the golden glory which waves above. When seen in this attitude, the bird of paradise really deserves its name, and must be ranked as one of the most beautiful and most wonderful of living things.'—vol. ii. p. 253.

Whilst at Singapore, preparing to return home, Mr. Wallace was fortunate enough to find two living specimens, both males, which, though the high price of 100*l.* was demanded for them, he immediately secured. He succeeded in bringing them safely to London, and there they lived for two years in the Zoological Gardens. Mr. Wallace feels sure that if a good-sized conservatory could be devoted to them, or if they could be turned

loose in the tropical department in the Crystal Palace, or the great Palm House at Kew, they would live in this country for many years.

Very interesting is the chapter in which we have a description, far more full and complete than any author has given us before, of the orang-utan, or mias, as it is called in Borneo. Mr. Wallace had unusual opportunities for studying the habits of this creature, as he succeeded in keeping a young specimen alive for several months; and he gives us, as he was sure to do, a very graphic description of his little pet. As, however, the greater part of what he has to tell us about oranges has appeared some years ago in the 'Annals of Natural History,' we need do no more than glance at it here. One point, however, may be specially mentioned. No specimen has been certainly found yet whose height was over 4 feet 2 inches, whereas the extent of the outstretched arms in such a specimen might measure 7 feet 8 inches. Anybody who imagines that 'anthropomorphous,' as applied to apes, means very much, may compare the drawing of a female orang at page 64, vol i., with, for instance, Mr. F. Leighton's exquisite Helios and Rhodos in this year's Academy. But our limits require us to stop here, and we do so, once more thanking both Professor Bickmore and Mr. Wallace for the very interesting works they have given us on that land of romance, the Malay Archipelago.
