were hung in the presence of his camp followers. This wholesome example proved to be the saving of his expedition. He emerged from the poisoned atmosphere of the forest, and says that he was amply rewarded when his remaining native followers kissed his hands in grateful acknowledgment of being delivered from death.

The party proceeded on, moving with great glee across the grassy slope amidst villages and cultivation, soon standing upon the brink of the crags which overhang the western shores of the Albert Nyanza of Baker. Here fresh difficulties arose; the suspicious natives would give them no canoes, would hold no intercourse with him. Emin Pasha's steamer was not in sight, and, after consulting his officers, Stanley retired to an entrenched position, sent Stairs, R.E., for his English-built boat, and, terrible though this journey has been in every form, the heroic Stanley won his point, and shook hands with Emin Pasha on April 29, 1888, 465 days after leaving Charing Cross to his relief.

It is quite possible that he may return to England by the end of May, but there are several reasons which may delay him. The difficulty of providing for so large a party as ten thousand followers belonging to Emin Pasha—this is a most anxious charge. Again, Stanley's thirst to solve the problem of the unexplored country south of the Albert Lake may lead him there, and I really feel more anxious about him since the arrival of his letters than I felt before we heard of his safety, for he is so fearless, he never sees a difficulty.

The marvellous growth of vegetation upon Stanley's route is not to be wondered at, as we know that in similar latitudes, such as Uganda, Borneo, and the Amazon, the same density of undergrowth and forest exists. A band of moisture encompasses the world at the equator, extending three to four degrees of latitude on either side; the vertical rays of the sun beat down with great intensity, and vegetation is almost seen to grow. In Uganda I have seen the banana trees, after being felled, shoot up from their centres immediately after their stems had been cut across; the roots of the trees are surrounded by spongy soil laden with moisture from the daily fall of misty rain, and the powerful sun completes the formation of the great forests of banana trees, without the aid of cultivation, beyond the help of the decayed leaves. We see the same process in the great belt of forest called in India the "Terai," which extends along the bases of the southern spurs of the Himalayas. Here the rains which fall upon these spurs, ooze out over the lands of the "Terai" and feed the roots of the magnificent forest trees, forming food and shelter for the wild elephant, boar, and swamp-loving creatures; but the atmosphere is almost certain death to all human beings except the inhabitants. We cannot, therefore, feel any surprise that Stanley and all his party suffered from sickness, and wonder how any of them escaped alive.

"Ugarrowa or Ulede Balyuz, a tent-boy of Speke's," an "Arab slave-dealer," is constantly mentioned in Stanley's interesting narrative. I am able to give some information about this person if he be the same "Ulede," one of "Speke's faithfuls," represented in the *Illustrated London News* of July 4, 1863, as "Ulede Senior," in a photograph taken by Royer in Cairo. He told me that he was a native of Uhiao, was captured by the Watuta in infancy, and sold as a slave to a Zanzibar trader. He was engaged by Speke as a load carrier, and became my valet, which he continued to be till our arrival in Cairo. He was thoroughly trustworthy, as many of his race are, and more intelligent than most of our men. He could name accurately every march in our journey, most of the trees and plants, and could tell a capital story. His career has been deservedly successful, and though from circumstances he has become a well-known dealer in slaves, I might ask what career is open to any young man of African origin who has never received the slightest education. Ulede Balyuz (*i.e.* the Consul's boy) has done good service in sheltering Stanley's sick, and in transmitting the graphic despatches which we have all read with profound interest, therefore he ought not to be condemned too hastily, but rather be utilized by the Congo Free State Government as the head of a district.

The dwarfs mentioned by Stanley must be very numerous, as he came upon one hundred and fifty villages of them. One specimen alone was seen by Speke and myself in Unyoro, and at least one perfect skeleton has been received from Emin Pasha by Prof. Flower. They seem very proficient in hunting, and used every conceivable device to poison the men of Stanley's party by placing staked pitfalls on the path, in the manner they would trap an elephant or antelope, and it appears they were only too successful.

We must wait for Stanley's return to hear more of the race of Manyema. I believe this race to be the Nyam-Nyam described thirty years ago by Mr. Petherick, but without knowing their tribal marks and arms, this cannot be decided. Meantime, these daring cruel savages have shot down poor Major Barttelot, and are engaged by the slave-dealers of Zanzibar to plunder, capture, and kill the inhabitants, and reduce the country to a wilderness; so that, through Stanley's brave deeds, we have our work of civilization before us. J. A. GRANT.

FURTHER NOTES ON THE GEOLOGY OF THE EASTERN COAST OF CHINA AND THE ADJACENT ISLANDS.

TWO years ago some notes were published in NATURE (vol. xxxvi. p. 163) on the geology of a portion of the coast of China, compiled from a report forwarded by Surgeon P. W. Bassett-Smith, R.N., of H.M.S. *Rambler*, to the Hydrographical Department of the Admiralty. Since then Mr. Bassett-Smith has extended the area of his investigations both to the north and south of the coast-line dealt with in this report, so as to embrace the whole eastern coast from Shanghai and Hong Kong; and has embodied his observations in two further reports to the Hydrographical Department. These documents, with the specimens referred to in them, having been submitted by the Hydrographer to the Director-General of the Geological Survey, Dr. Hatch, of the Petrographical Department of the Survey, has drawn up the following abstract of the reports and notes regarding the specimens:—

Speaking generally, the whole coast between Shanghai and Hong Kong consists of granite; the high mountain-ranges, especially in the south, present chiefly this rock. Flanking the granite on various parts of the coast are vast masses of crystalline schists (gneiss, mica-schist, &c.), parts of which are rich in metallic ores, even auriferous quartz occurring, as at Chinsan, and more plentifully in the Shangtung province, where it is profitably worked by the Chinese. A curious conglomerate, found at Sharp Point Islands, River Min, at Davis Island, Yangtse-kiang, and also in the Shangtung province, is overlain by slates, probably of Cambrian age, but for the most part unfossiliferous, although some fish-remains and Algæ have been found in the Shangtung province.

In the northern part of the coast (Chusan to Shanghai) there are many traces of ancient volcanic activity. The older volcanic rocks consist of porphyritic felsites (Chinsan Island, Davis Island, Elliot Island, Bonham Island, and Side Saddle Island) and basalts (Changtau), both of which are intrusive in the granite and crystalline schists. More recent volcanic tuffs and breccias were obtained in a quarry near Ningpo.

The Chusan Archipelago.—Of this group of islands, situated at the mouth of Hang-chow Bay, south of Shanghai, the northern members have a marked vol-

canic character, the rocks composing them being volcanic conglomerates, breccias and tuffs, together with felsitic, trachytic and basaltic lavas, the more acid types of which show well-marked flow-structures. The vents from which these lavas were erupted are situated chiefly in the large island of Chusan; another focus of emission is probably represented by Changtau Island.

One of the most noticeable features of the group is presented by the vast stretches of land that have been rescued from the sea. Many islands formerly isolated have been united; and broad plains of rich alluvial ground have been reclaimed, are now highly cultivated, and support a dense population. This has been chiefly brought about by the construction of strong embankments and sea-walls from point to point across the bays, after the latter had been allowed to become partly silted up by the mud brought down from the Yangtsze River and Hang-chow Bay. This difficult work testifies to the marvellous energy and industry of the Chinese.

Details are given of the geology of the following islands of the Archipelago:—

Video Island, the outermost of a long chain of islands, extending in a west-south-west direction, has a conical shape, with steep cliffs, and consists of a pinkish quartz-trachyte, penetrated by numerous dykes of basalt.

Tripod Island, an elongated island, about 600 feet high, sloping moderately to the west, but descending on the east almost perpendicularly into the sea, is composed of a volcanic breccia, frequently penetrated by dykes of basalt.

Keusan Island, a high island of irregular elongated shape, separated from Changtan Island by a narrow channel of 5–7 fathoms, with a good anchorage, presents, at its north-eastern end (Radstock Point), a coarse volcanic breccia ("trachyte-conglomerate"), with which are associated well-banded acid lavas (trachyte). In other parts of the island a greenish tuff occurs, which is abundantly penetrated by an interlacing system of basaltic dykes.

Changtau Island, a rugged island with a double-peaked summit, shows, along its west coast, cliffs consisting of a stratified green tuff and trachyte-breccia, with dykes of basalt and flows of a well-banded trachytic lava.

Taeshan Island, a series of high hills attaining to a height of 700 feet, connected by broad alluvial plains, consists on its north-east coast of a grey quartz-porphyry, weathering blood-red, and salmon-coloured felsites, penetrated by numerous dykes of basalt.

Show Island is formed entirely of a coarse trachyte-breccia, containing large angular fragments. This rock is much quarried, the stone being conveyed away in junks.

Volcano Island, the most westerly of the chain, is composed of the same volcanic breccia, associated here with felsitic lavas.

North-East Islet, off Chusan Island, and Nine-Pin Rocks are composed of a compact dark-coloured felsite, with a marked bedded character. In places the rock shows distinct flow-structure.

Poo-too Island consists of a high peak, separated from a number of smaller ones by deep gullies, filled with blown sand. The summit of the hill is formed of a compact white trachyte, which has been erupted through the granite forming the base of the hill.

Chusan Island, the largest of the group, being twenty-two miles long and ten miles wide, consists of a long range of mountains, many peaks of which are over 1000 feet high. Between the numerous spurs given off from these mountains lie tracts of highly fertile land, the lower parts of which have been recently reclaimed, and are protected by a series of embankments. Outside the outermost of these the mud-flats are used for the collection of salt, to obtain which the mud is scraped up, filtered, and the brine evaporated in wooden trays. The old cliff-line now stands far back from the present coast; and former islands appear now as isolated hills. This island is less bleak than the smaller ones of the group, owing to the protective influence of the small fir-trees that are encouraged to grow on the hill-sides. Other trees here met with are the camphor, tallow, maple, and numerous evergreens in the neighbourhood of the villages. The rocks are quartz-porphyries and felsites.

Lateo Island consists of a coarse volcanic breccia, containing large angular fragments of quartz-felsite. This stone is extensively quarried.

Ketsu Island.—A small rugged double island off Chusan, consisting of dark-banded felsite with small porphyritic crystals of red felspar.

Blackwall Island.—A large well-cultivated island, with hills of dark-coloured felspar-porphyry and felsite. Volcanic breccia also occurs, penetrated here and there by basalt dykes.

Kintang Island.—A large island near the mainland, presenting a fine, pointed summit of red felspar-porphyry. Along its cliffs are highly contorted volcanic breccias and felsites.

Taoutse Island.—A small narrow island of red felspar-porphyry (red felsitic ground-mass embedding small bright red crystals of felspar).

Changpih Island.—A large island with much reclaimed land; red felspar-porphyry.

Chinhai Island.—A small rock in the mouth of the Ningpo River, composed of the same red porphyry.

Rambler Island, Hang-chow Bay.—A rounded mass with steep smooth sides, composed of volcanic breccia and brown felspar-porphyry.

Mr. Bassett-Smith adds that no traces now remain on the China coast of the volcanic activity that gave rise to the enormous accumulations of lava and tuff referred to in the above notes, with the exception of a few scattered hot springs. He is of opinion that after the eruptions ceased, a subsidence must have taken place, but that the ground is now probably rising.

WHICH ARE THE HIGHEST BUTTERFLIES?

THE following extracts from a letter received a few weeks back from Mr. W. H. Edwards, of Coalburgh, touch on this question, and may be of interest to lepidopterists. Having now for many years ceased to give attention to this subject, I cannot express any opinion, but I think Mr. Edwards's facts are very curious, and the conclusion expressed in his last paragraph not far from the truth.

ALFRED R. WALLACE.

"In a recent part of my vol. iii. I have figured one of the high Alpine Colorado Erebias, *E. Magdalena*, found on the extreme summits, among nothing but rocks. I have also succeeded in breeding another of the Alpine Erebias, *E. epipsodea*, from egg to imago, and have a full set of drawings for plate. Have also had *Chionobas chryxus* (also Colorado) and imago, and have all the drawings there. Connected with these Alpine species is a matter I talked over with you, and of which I now write. There must be many genera of Satyridæ in which the larvæ are thick-bodied, inert creatures, very much like many of the Noctuidæ. I have twice raised *Arge Galatea* from egg to imago. This larva is remarkably like a Noctuid in shape, inertness, in the manner it lies on the ground—curled up so that head touches tail, in a ring, or like a *d*. The pupa is so like a Eudamus, that when I sent one to Mr. Scudder to ask what it was, he replied, 'Some Hesperid probably, very near to *E. tityrus*.' It is made loose on the ground or