

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 Yangtze 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-porphry, 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 col-

lection 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-porphyrines 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-porphry 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-porphry. Along its cliffs are highly contorted volcanic breccias and felsites.

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

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

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

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

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 σ . 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

in the sod, there being no outer case, and no attachment. The usual hooks of the cremaster are not bent, but straight out and few. Now the *Erebia epipsodea*, and the three *Chionobas* which have been bred in this country, *C. chryxus*, *semidea*, and *jutta*, are like the *A. Galatea* in larval habits and appearance, and the pupa is unattached, and has actually no hooks at all. I read in Buckler, that *Satyrus Semele* actually makes a case underground (like some of the *Sphingidæ*), and is inside that like a *Hesperid*. It is to be supposed that many genera of the *Satyridæ* pupate unattached, or in cocoons. Mr. Scudder says the eggs of *Satyridæ* are very like the *Hesperidæ*, and has to admit the resemblances I have spoken of in the other two stages. But he passes over all this as a mere trifle, and insists that 'in the prime features,' as he calls it, of the imago, the *Satyridæ* 'out-rank all others.' Now what are the 'prime features' he tells about? They are two: one is that the pupa hangs by the tail, and that there is a regular progression from the *Hesperid* style of attachment through the *Papilionidæ*, the *Lycænidæ* and the *Satyridæ*; and that the flat ventral side of pupæ in what he calls the higher families, the *Suspensi*, is an evidence that once they or their ancestors were attached by a girdle, like the *Papilionidæ*. The other is the atrophied condition of the fore-legs, which is more extreme in the *Satyridæ* than in any other family, and reaches the last degree in *Chionobas*. He, in his 'Butterflies of New England,' now issuing, puts *Chionobas semidea* at the head of the North American butterflies, the top rung of the ladder, beyond which we can go no farther! This is what I call your attention to.

"When we used to study 'Euclid,' we sometimes proceeded by an apparently correct mode of demonstration, till we came to 'which is absurd,' and I hold that this conclusion of Mr. Scudder is absurd on its face. Here is a butterfly on the top of the White Mountains of New England. Its species is found nowhere else than in Labrador and in Colorado, in the latter on the loftiest summits. There is no difference between the three butterflies from the three regions, and yet they cannot have had any communication for untold ages. It is considered as a relic of pre-glacial times in the White Mountains. This butterfly lives in a semi-torpid condition through its short season, lies about on the rocks, has but a trifling power of flight, and dodges the high winds in crevices of rocks. To say that an insect which for perhaps 50,000 years has lived this sort of life, and has not changed in all that time, is the most advanced in the scale of North American butterflies, and so of all the world, is absurd and ridiculous! The wonder is that it has not lost the use of its wings. Therefore the argument is wrong somewhere that leads to such a conclusion. If the premises are allowed to be correct, then the reasoning has a flaw.

"I do not believe there ever was any derivative progression from one family of butterflies to another. And we cannot say that the *Papilionidæ* are derived from the *Hesperidæ* (either because of six legs, or the epiphysis, or any other reason), or the *Papilionidæ* from the *Lycænidæ*, or the four-legged families from the six-legged. There is not in the rocks a particle of evidence of such a progression, and the whole thing is the merest fancy. Any differences between families are not owing to derivation, but to the development of each independently, like the rays of a fan. "W. H. EDWARDS."

NOTES.

WE regret to have to record the death of Mr. Warren De la Rue, F.R.S. He was born in 1815, and died on Good Friday, after a short illness, from pneumonia. Mr. De la Rue was a most devoted observer and munificent patron of astronomy, and in him and Balfour Stewart solar physics has lost its chief founders.

THE death is announced of Dr. Paul du Bois-Reymond, Professor of Mathematics at the Technical High School of Berlin, and formerly at the Universities of Freiburg and Tübingen. He was the author of two well-known mathematical works, and brother of the eminent physiologist of the same name. He was born on December 2, 1831, and died at Freiburg in Baden, on April 7.

THE Rev. J. H. Thomson, Vicar of Cradley, whose death is announced, had made what is described as an extensive and valuable collection of European plants, and it is understood that he has bequeathed them to the Worcestershire Naturalists' Museum.

THE National Union of Elementary Teachers has been holding its twentieth annual conference this week at Birmingham. The conference was opened in the Town Hall on Monday afternoon, when an address was delivered by Mr. R. Wild, the President-elect, on the report of the Education Commission, and on the latest edition of the Code. The defects of the existing system of national education were discussed at a crowded meeting on Tuesday evening. Mr. Chamberlain, in addressing this meeting, spoke of payment by results, in the sense in which the expression is now used, as a method which everyone condemns. "We want you," he said, "to show us a better way, and it is through such conferences as those which are now being held that Parliament and the Government may hope to find, tested by your practical experience, a substitute for a system which we desire to alter."

THE picture of Sir William Bowman, by Mr. Oules, R.A., has, by special permission, been exhibited to subscribers in the Marsden Library of King's College, and has now been sent to the Royal Academy. The list of subscribers numbers 420, and will be closed on June 1.

SIR ROBERT BALL, the Royal Astronomer of Ireland, has just been elected an Honorary Fellow of the Royal Society of Edinburgh.

PROF. CORFIELD, M.D., has been elected a Corresponding Member of the Italian Association "Dei Benemeriti," and awarded a gold medal for his contributions to hygiene.

DR. SCHWEINFURTH arrived at Aden on March 23, on his return from a three months' stay in Central South Arabia. He has started for Europe, bringing a very interesting botanical collection with him.

THE *Japan Weekly Mail* says that Mr. W. Gowland, who has occupied a prominent place in the Imperial Mint at Osaka, has retired from the Japanese service. In 1872, Mr. Gowland was selected by Dr. Percy, of the Royal School of Mines, London, as Chemist and Metallurgist to the Japanese Government. His first task in that country was the organization of the metallurgical department of the Copper Mint and the establishment of chemical and metallurgical laboratories. He subsequently filled the posts of Technical Adviser and Assayer, and as such was directly responsible for the accuracy of the coinage. Amongst other reforms at the Imperial Mint he introduced a novel process by which crude copper could be converted into bronze coinage bars at one operation, and also elaborated processes for the coinage conversion. His investigations into the effect of bismuth on the ductility of silver are well known. He made many interesting discoveries amongst the tumuli and shell-heaps in the interior. The Emperor conferred several distinctions on him before his departure.

THE Berlin Academy of Sciences has lately been presenting various sums of money to promote scientific research. Dr. Franz-Stuhlmann, assistant at the Würzburg Zoological Institution, has received £50 (Mk. 1000) to enable him to proceed with his