2. Eupithecia trisignata, reared from the larva.

3. A pair of Noctua ditrapezium, also reared; these were very large, expanding an inch and three-quarters.

4. Sesia Sphegiformis, believed to be the first ever bred in England.

5. Sesia Scoliæformis.

6. Œcophora grandis, from Llangollen.

7. Pterophorus lithodactylus and P. osteodactylus, from Llanferris.

8. A bunch of cocoons of Ennychia cingulalis.

9. A series of a new species of Tinea.

10. Ten varieties of Abraxas grossulariata, bred this year, the larvæ having been fed on black currant and radish tops; there was not one of the normal colouring, and three of them are splendid varieties.

Mr. C. S. Gregson sent for exhibition Pterophorus osteodactylus, discovered by himself when on the rocks at Llanferris, on the 22nd of July, 1862.

A note from Mr. Gregson was read, in which he mentions having reared Cimbex Lucorum, male and female, and its parasite, from pupæ sent from Scotland by Mr. John Stafford: it is a true birch-feeder, and new to Britain.

A pupa of Petasia nubeculosa was exhibited to show the large hook or forked-tail appendage.

Mr. N. Cooke exhibited seven specimens of Sesia Scoliæformis, four bred and the other three captured by himself and son at Llangollen, on the 13th of July, 1862.

The Secretary read the following note by Mr. Gregson:—

Note on Mr. Newman's Description of the Larva of Orgyia fascelina (Zool. 8078).

"One error in Natural History is well known to be the father of a whole race of errors, but it is especially likely to be so when made by a man of Mr. Newman's standing, for all book-makers will claim to be excusable if they copy his works. I therefore wish to call the attention of naturalists to one or two mistakes he has evidently been led into by some one who knows nothing whatever about the habits of this species. Mr. Newman says the eggs are laid in August on the leaves of Salix fusca. Here are two mistakes in the length of one line; the first is impossible, unless the insect lives two or three months in the perfect state, for, as a rule, it appears in May or June on the banks of the Mersey, and any boy knows that this species lays its eggs round a rush, stick or twig of any sort, just as does Saturnia Carpini, and some of the collectors in this neighbourhood would prefer searching for its eggs or larvæ on a thorn hedge if they wanted a supply for their friends, not but what it will and does eat sallow where no thorns are, just as it eats heath where there is neither thorn nor sallow. The larvæ are abundant in this district on both thorn and sallow, but I doubt if my practical friends here ever knew it to lay its eggs otherwise than round a twig or grass stem, where it forms a beautiful symmetrical object."

The Secretary then read the following paper by Mr. Edwin Brown, of Burton-on-Trent:—

On the Mutability of Specific or Race Forms.

"The question how did species originate has suddenly become the most absorbing scientific topic of the day, but it is doubtful whether we are ever likely to arrive at more than the barest inferential evidence touching the origin (properly so speaking) of species, or, in other words, at a knowledge of the earliest differentiation of forms when

first inanimate matter became animate. If, however, the phrase 'origin of species' be considered to relate only to the assumption by animals and plants of those exact forms which they now present to our observation, it is tolerably certain that careful reasoning from exact data will lead ultimately to correct notions as to the relationship by descent of races, and consequently to the origin of existing so-called species. Many years before Darwin promulgated his doctrine of 'selection of races' I had formed my own conclusions relative to the now fixedness of species, and being unable to find any support in nature to the theory of uniform 'progressive development,' I framed the hypothesis that species or forms are, and ever were, mutable, sometimes advancing in the scale of organization, sometimes retrograding, but always varying,—the sons from their sires, and the sires from the patriarchs of their respective races. I termed the theory 'The Mutability of Species, or the Mutation of Generations.'

"Mr. Darwin has dwelt ingeniously and satisfactorily upon one cause for the alteration of forms of life, *viz.* that of the greater fitness to surrounding circumstances in the struggle for existence of certain slight modifications of structure. He has dwelt so exclusively upon this branch of the great subject as almost to lose sight of other agencies; for example, the direct influences of climate and food, and the accumulative effects of those apparently causeless individual variations that take place at every generation. It is to the latter law that I am myself disposed to attribute the greater portion of the mutation of forms or of so-called species. Let us suppose a separation by an intervening ocean of the two portions of a large tract of land that were previously united, and let us further suppose the whole of this land to have been inhabited at the time of the cataclysm by some race, say of geodephagous insects. We will distinguish these two now separated portions of land as the eastern and the western. The generations of the insect in question that came into existence after the separation of the land would succeed each other as their ancestors had previously done, each individual differing somewhat from the parents and each pair handing down to its progeny a structure embracing what may, for the sake of explanation, be termed the hereditary typical form, together with a portion of the joint peculiarities of the parents themselves, and combined with that certain degree of individual peculiarity by which peculiar facies or appearance the new-born individual would be known to the critical eye from all other individuals of the same race. The conjoint effect of hereditary transmission of form and individual peculiarity will have taken in the eastern tract one direction, in the western probably another: food, climatic conditions of heat and moisture, and natural selection, will have acted directly and indirectly in giving some bias in respect of form, size, colour and appetites, which, in the individuals of either one of the restricted districts, will have assumed a degree of uniformity owing to the interbreeding. In the meanwhile, different influences have been operating in the other isolated district, and the mutable tendency of the race, on the ordinary doctrine of chances, will, almost as a matter of inevitable certainty, have set up a bias differing in some respects from that of the generations in the opposite district. It thus results that the longer the period of time during which separation has existed the greater the chance of divergence, and if the races in the two separated tracts of land have been kept apart for a long period of time, say for some thousands of years, we may reasonably look to find a very sensible divergence of forms, sufficiently so to set naturalists disagreeing as to whether they ought to call the forms by two different specific names, or whether the two should be considered varieties merely of each other. This is the view I took in reference to mutation of forms or transmutability of species,

and I now propose to lay before you the insects which, to my thinking, as nearly demonstrate the truth of that theory as demonstration can be arrived at. In the first place, I lay before you a series of North-American Lepidoptera, collected chiefly by the late Mr. E. Doubleday, and putting, as far as I am able, the European analogues side by side, you will see a striking illustration of the common phrase, 'the same with a difference.' Several years before the death of the late Mr. J. F. Stephens, I was talking with him on the subject of these very specimens, when he told me a friend had one day brought to him, by way of a joke, a box of United States Lepidoptera, they being the analogues of British species, when, on opening the box, believing them to be British, his involuntary exclamation was, 'What a wonderful assemblage of varieties.'

"It must be very far back in point of time, although perhaps, geologically speaking, of recent date, that the Atlantic was so far bridged over, as that the individuals of any race of insect could interbreed, and thus render the bias of mutation, to a certain extent, uniform throughout the larger area. We have, in the difference between the parallel forms now exhibited, a measure of the effects of separation through a very long period of time, and when we see, however decided the difference in minor characteristics, how slight is still the separation of form from form, we need not wonder that no appreciable difference can be found between the figures of the ostrich on ancient Eastern monuments and the bird itself still living, under the same circumstances of climate and food that surrounded it three thousand years ago, and of which fact Mr. Westwood makes so strong a point in favour of the permanency of species.

"The other specimens exhibited are Nebria and Calathus from the Shetland Isles. They will all be found to differ, to an appreciable extent, from specimens captured on the mainland of Britain. It is probable that the separation of these areas took place at a much later date than the epoch of the separation of North America from Europe. It would therefore have been interesting to have compared the Lepidoptera of Shetland and Britain, only that the distance to which the islands are removed from each other is so small as to vitiate the conditions of the experiment by individuals occasionally flying over from one area to the other. I regret I have intermingled in my collection specimens of several other species of Shetland Geodephaga with British-caught specimens, as nearly all the Geodephaga from those islands exhibited characteristic differences in the shape of the thorax, or of some other portion of the structure, distinguishing them at once from mainland specimens, and affording characters sufficiently definite for a manufacturer of species to found new specific names upon. To the naturalist who busies himself with nomenclature there appears to arise a great practical difficulty from the disbelief in the permanency of species; but does not also the naturalist who has full faith in the lastingness of specific forms, spend much of his time in trying to ascertain which forms are properly designated as species and which as varieties merely? I am inclined to think, when once the fixity of species has ceased to be a matter of faith, as it certainly will do sooner or later, principles of nomenclature will be framed that will sweep away that dreadful incubus of synonyms under which we now labour.

"Let us try to answer the following question on this subject, Ought the North-American and the European analogues of each other to bear the same or different names? Where a difference of form exists between the individuals inhabiting the two extreme geographical points of a large area, as when a North British form can readily be separated from a South British one, ought the extreme and all the inter-

mediate forms to bear the same cognomen? In the latter case, I would say, let all the forms bear one name corresponding to what we now call the specific name, but which would be better termed the 'race name,' adding to that name the name of the district in which the distinctive form occurs. When, however, allied forms are separated by a wide ocean, and there is consequently no opportunity of tracing the relationship of consanguinity, and thereby of ascertaining whether the divergence has become so great that there exists an inability to interbreed, it is better to give distinctive specific or race names, however strong may be the suspicion that the difference would break down were the two forms supplied with the means of intermingling. The question resolves itself pretty much, therefore, into a geographical one, and as such it will ultimately be treated. We need not dwell upon those individual varieties that occur in the same broods of insects, nor on the question of the limits of genera. All are agreed that chance varieties should bear one common race or specific name, and it is manifest that if specific forms are found to be mutable the limits of genera cannot be more stable. Recent researches of entomologists prove that great differences exist between the external organs of generation of closely-allied species. To this circumstance probably may be mainly owing the fact that we find so few mules between races inhabiting the same district. This inability to interbreed may possibly prove to be one of the laws of Nature, by which excessive variation of individual forms is prevented.

"In our researches into the nature of species we need not attempt to go back to the origin of all things. Let the question of permanency or mutation of species be discussed as geological phenomena are reasoned upon by modern geologists,—beginning at the known, and working backward so far as reason and facts will safely carry us, leaving all anterior to that to speculative world-builders.

"The question of the primary origin of species has the same relationship to the question of the mutation or permanency of forms that Cosmogony has to Geology. One is a mere speculation, the other a precise science. We shall never know more about the first forms of the animals and plants that occupied the earth than we do about the origin of this planet itself, but we may surely entertain a doubt about the permanency of species without being ranked as dangerous schismatics. If, however, fair induction lead to the conclusion that all animal life evolved by slow degrees from some individual monad, I will not shrink from that conclusion. Surely it gives a worthier notion of a Creator to suppose that he foresaw all contingencies, rather than that he should be ever remaking and recreating by the direct interposition of his providence.

"In the eloquent language of an American writer, 'The scheme of creation is a question of *will*, and not, as the insanity of logic has assumed, of *power*. It is not that the Deity cannot modify his laws, but that we insult Him in imagining a possible necessity for modification. In their origin these laws were fashioned to embrace *all* contingencies which could lie in the Future. With God all is Now.'"

Mr. Birchall did not see how the views of Mr. Brown differed from Mr. Darwin's theory.

The Rev. Joseph Greene remarked that East and West would produce forms of the same insect that, at a distance of time, would be mistaken for different species, and that before we can say an insect does this and does not do that, our observations must be much more extended than they are now.

It was also remarked that the wonder is that species have not varied more than

appears from the specimens exhibited, and the fact of the external organs of generations of closely-allied species differing so much tends to prove that species are permanent, also that some species so closely allied, in the imago as to be indistinguishable, are totally different in the larva state, and an interesting discussion ensued.—*G. H. Wilkinson.*

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

[It seems desirable to preserve some record of this important gathering, although the great extent to which the reports in the 'Times' newspaper have extended render anything approaching to a concise or condensed record extremely difficult. Below I have given but little more than the titles of the zoological papers, and some even of these have probably been omitted through inadvertence.]

Dr. T. Spencer Cobbold, F.L.S., offered some remarks on all the known forms of human Entozoa, illustrated by an extensive series of original drawings. He stated that the human body was liable to be infested by no less than thirty species of internal parasites, and he communicated the results of his studies and researches into the history, structure, habits, mode of development, and migrations of each individual form. He demonstrated the possibility of checking the progress of several fatal entozootic diseases, and he appealed to the Association to support him in his experimental researches into the mode of production of these remarkable animals. From the investigations which he had already carried on independently, Dr. Cobbold appeared to have obtained results of great importance, both in a social and economic point of view.

Professor Balfour read a paper by Mr. James Buckman, giving an account of experiments with the seed of malformed roots, and on the ennobling of roots, with particular reference to parsneps.

Dr. E. P. Wright read a paper, contributed by Mr. James Samuelson, "On recent Experiments on Heterogenesis, or Spontaneous Generation."

Professor Owen read a paper "On the Zoological Significance of the Brain and Limb Characters of Man, with Remarks on the Cast of the Brain of the Gorilla." The Professor exhibited two casts—one of the human brain, which had been hardened in spirits, and had therefore not preserved its exact form, but to all intents and purposes it would serve as an illustration of the human brain; the other cast was taken from the interior of the cranium of the gorilla. From an examination of these the difference between the brain of man and that of monkeys was at once perceptible. In the brain of man the posterior lobes of the cerebrum overlapped to a considerable extent the small brain, or cerebellum; whereas in the gorilla the posterior lobes of the cerebrum did not project beyond the lobes of the cerebellum. The posterior lobes in the one were prominent and well marked, in the other deficient. These peculiarities had been referred to by Todd and Bowman. From a very prolonged investigation into the characters of animals, he felt persuaded that the characters of the brain were the most steadfast; and he was thus induced, after many years of study, to propose his classification of the Mammalia, based upon the differences in the development of their brain structure. He had placed man—owing to the prominence of the posterior lobes of his brain, the existence of a posterior cornu in the lateral ventricles, and the presence of a hippocampus minor in the posterior cornu—in a distinct sub-kingdom, which he had called Archencephala, between which and the other members of the Mammalia the distinctions were very marked, and the rise was a very abrupt one.