Miscellanea.

Arctic Researches.

From the Address of Sir R. I. Murchison, *at the Anniversary Meeting of the Royal Geographical Society of London.* May 24th, 1852.

When quitting the chair of the Society in the spring of 1845, I announced the departure of my valued friend, Sir John Franklin, on his third expedition to determine the problem of a north-west passage: I then felt the fullest confidence, that every thing which could be mastered by human skill, and a chivalrous devotion to the object, would be accomplished by that eminent navigator and his associates. Alas! that seven years should have elapsed without tidings of them; but honour to the Englishmen who still cling to the hope that these brave men, or a portion of them, may yet be discovered, and who cheer on the new expedition which has just left our shores under Sir Edward Belcher and Captain Kellet—men, whose resolution, knowledge, and experience well qualify them to carry out their arduous mission of tracking their long absent friends. On the last day which he passed on the shores of N. Britain, Sir E. Belcher thus wrote to me from Stromness:—"One feeling seems to pervade us all—a stern resolve to deserve a little of what has been too freely supposed we may merit. Under the blessing of God, we hope to prosper; but our predecessors have left us a hard game to play. I can, however, foresee much interesting matter for the Geographical Society, even if the great object of our mission be not successful."

As it is not my part to advert, on this occasion, to the efforts which have been made in former years to obtain intelligence of the missing expedition, I will simply take up the subject from the point at which my predecessors left it.*

The Reports of the recent Arctic Committee, composed in great part of eminent northern navigators, have elicited graphic accounts of the services performed by Captains Austin and Ommanney, and the officers under their command, in exploring the bays and headlands beyond Barrow Strait. The diaries of the officers who were detached with sledges to search in different directions from their winter head-quarters, and particularly the lively and highly descriptive work just published by Lieutenant Osborne, afford proofs pregnant of what can be accomplished by British officers and seamen

* See a very useful compendium of the recent "Arctic Searching Expeditions," by our associate, Captain Mangles, R.N. Second Edition 8vo.

under severe privations.* In conjunction with the journeys of Dr. Rae, of which I have already spoken in presenting our Founder's medal, they have satisfied us that Franklin's expedition could scarcely have passed to the south or west from Barrow's Strait; and as the greater part of Baffin's Bay has been tracked, we are now more than ever led to believe that, if not submerged, the gallant explorers must really have passed through Wellington Channel. The chart of the Discoveries in the Arctic Sea up to 1851, recently published by the Admiralty, is, in fact, the document on which geographers may scan the merits of those zealous men. By reference to it, and to a general map prepared by Arrowsmith, we now see at a glance how much new territory was delineated by each of the officers detached by Captain Austin, and also how far Captain Penny extended his researches to the north of Wellington Channel into what is termed the Queen's Channel and Penny's Strait in the Admiralty document. The last-mentioned exploration of an experienced polar seaman, in sketching the outline of grounds between which Sir Edward Parry saw an open channel of water in the year 1819, when combined with the relics found at Beechey Island and Cape Riley, has also led to the belief, which is prevalent, that Franklin really passed through Wellington Channel.

One portion of the new expedition (we are now informed by the published Admiralty instructions), after making a searching examination for despatches or relics of Franklin between Beechey Island and Cape Bowden, will, if circumstances require and permit, penetrate northwards by the Wellington Channel; whilst another portion will proceed to Melville Island, and, after wintering there, make a spring excursion. In this way it is supposed the explorers may detect and follow up the track of the missing navigators, or, perchance, succour Captain McClure, who forced his way into the ice from Behring Strait, purposing to reach the north shores of Melville Island to the north-east. If, on the other hand, possession should in the first instance be obtained, at or near Beechy Island, of any despatches of Franklin intimating his intention of returning from that point, then, of course, the expedition will also return, endeavouring by the way to determine the fate of our brave countrymen, who in that case may have perished in Baffin's Bay.

Whilst these efforts are being made from the north-west, our recent researches from the north-east by Behring Strait have, I regret to say, been confined to sending out stores by Captain Macguire, with instructions to advance the *Plover* with some of the supplies beyond Cape Barrow, so as to afford a support to the crew of the adventurous navigator McClure, who, having out-sailed his Commander, Capt. Collinson,

* Of the officers under Captain Austin who travelled in sledges, Lieut. (now Commander) M'Clintock accomplished the greatest distance, viz. 760 miles along the South coast of Melville Island. This, however, was exceeded by Captain Penny, who, according to Arrowsmith's map, travelled 930 miles in exploring northwards from Wellington Channel.

had passed to the north-east, and has not been heard of since he entered the ice. *

As there exists no clear evidence of the route taken by Sir J. Franklin, we cannot speculate with confidence on any one line of research being more likely to succeed than another. The presumptive evidence, however, being much in favour of his having forced through Wellington Channel, after having waited for some time at or near Cape Riley, the Admiralty has judged wisely in directing the chief efforts to that point. At the same time, it is much to be regretted, that a simultaneous national endeavour could not have been made by the employment of a *steam-vessel* from the side of Behring Strait, and by extending the researches of Captain Kellett in his sailing vessel, the *Herald*, beyond the island named after her. That gallant officer having all along been of opinion that an application of steam power in Behring Strait might prove successful, in enabling the explorer to work round to *meet* Franklin through lanes of water between Siberia and the northern packs of ice, until an open Polar sea might be reached, it was with true gratification that I made every exertion to forward two successive projects, in which the Council and Members of this Society took as deep an interest as Lady Franklin and myself.

Many persons who know that it was the resolve of the inflexible Franklin to penetrate, if possible, by the north-west into an open polar sea, and to navigate in it until he reached the longitude of Behring Strait, have thought that, if he really passed through Wellington Channel, and did gain such a sea, he may have made considerable progress westward; and that then, if compelled to abandon his ship, he might have taken refuge on land, where some of our countrymen may still be living on the natural produce of the region, but cut off from all communication with countries to which we have access.

It is this idea, mainly founded upon the character of Franklin, which has induced many geographers to attach value to such an hypothesis. On this ground we supported the bold project of Lieut. Pim, one of the officers of Captain Kellet, who proposed a plan of research by which he hoped to go far beyond the tracts formerly explored by Admiral Wrangel. Travelling over Siberia to the extreme edge of the Russian settlements (a journey which occupies the post six months), he designed to traverse the wilds of the Tchuktchi race, and from their shores to pass over channels of water in India-rubber or skin canoes to tracts inhabited by the most northern Esquimaux, and there endeavour to learn the fate of his countrymen.

† Capt. McClure intended (as expressed in a letter to Sir George Back, dated July 28, 1850, from Kotzebue Sound) to take the first opening in the ice, and try for Banks Land, being careful not to be caught in the bight to the S. E. near Boothia: his next object being to get to the northward of Melville Island, and afterwards to try to pass to the S.E. by the Wellington or some other channel, all of which operations, as this brave man estimated, might be so accomplished as to enable him to return home, at least, in 1853.

When this arduous scheme was first mentioned to me, I foresaw considerable difficulty, though not all the obstacles with which it was beset; but as at that time the intrepid young officer had obtained the approval and countenance of Her Majesty's Foreign Secretary, * and was certain to proceed to St. Petersburgh, I felt it to be my duty, as your President, energetically to support the enterprise. I did so, however, on the express condition (and my letters to the Imperial authorities were so penned) that the expedition must be entirely arranged and executed by the Russian Government. I was led to hope that, as thirty years had elapsed since their voyagers, Wrangel, Anjou, and Matiushkin, had explored those inhospitable snowy deserts, the Imperial Government might wish to renew and extend such inquiries, and thus become better acquainted with the outlines of north-eastern Asia.

This view was warmly supported by the illustrious Humboldt and by Adolf Erman; and Colonel Sabine, having instructed Lieut. Pim in the method of taking magnetic observations, stated to me that a few of these correctly made in the north-east of Siberia would be worth the expedition, for their important bearing on terrestrial magnetism. The first Minister of the Crown † had granted a sum in aid, and every thing seemed for a while propitious; whilst the King of Prussia bestowed marks of kindness on the young officer as he passed through Berlin; and Sir G. Hamilton Seymour, the British minister at St. Petersburgh, most kindly entertained him.

The Reports, however, of the Russian authorities to His Imperial Majesty, particularly a document prepared by Admiral Matiushkin, were averse to the renewal of any such enterprise. They represented that, in order to enable travellers, furnished with instruments and interpreters, to traverse the ultra-Siberian country of the Tchuktchi, previous arrangements of eighteen months would be required to assemble the necessary quantity of dogs and sledges; and that, as the former expedition had, by withdrawing the use of many of these animals, produced fatal diseases among the natives and a great mortality, such an extraordinary effort ought not to be renewed without motives of overwhelming necessity.

In short, being informed that such an expedition could not be put in motion before March, 1853, and being aware of the responsibilities which they would be led into, whether as respected their relation to the native tribes, or to the young British officer whose life they thought would be uselessly perilled, the Imperial Government declined to co-operate in the project. At the same time they gave Mr. Pim permission to travel in any direction he pleased through Siberia; but, by my own advice and that of other friends, he reluctantly abandoned the scheme. On his return from St. Petersburgh he immediately volunteered to serve again under his old commander Captain Kellett, and he has now sailed with the Arctic expedition; not, however, before he had, with the sanction of our Premier, handed over the balance of the sum advanced to him to help on another expedition to Behring Strait. Let me further state, that, whilst he was in Russia, our

* Viscount Palmerston. † Lord John Russell.

countryman received marked attention from the Court, and from the Imperial Geographical Society, and even had an interview with the Emperor. And, if this scheme was frustrated, I must assure you that his Imperial Majesty has not ceased to desire to afford every countenance to those expeditions in search of Franklin which, in his opinion, offer any chance of success.

For example, Captain Macguire, R.N., having been suddenly ordered off to take command of the *Plover* in Behring Strait, and being charged to leave a quantity of his supplies at the Russian Fort of Michaelowski, it became necessary to have authority to do so, and instantly on application to Baron Brunnow, who was well acquainted with the wishes of the Emperor, the requisite letters were furnished. Again, when requested to succour the private expedition to Behring Strait, which was to have proceeded under Mr. Beatson, the Imperial Government cordially responded, and furnished passports and recommendations to the Imperial officers on the Asiatic and American shores of that sea, for the use of this private expedition.

I am thus led necessarily to make the painful announcement that this last mentioned enterprise, for which many of us have subscribed, has been suspended, and that the hope of entering with any vessel far into the ice this season, between Siberia and the "unknown" north, is at an end. Want of adequate means, and the unexpected personal embarrassments of the ingenious commander, to which it is unnecessary here to refer, have prevented the departure of the *Isabel*, *the only screw-vessel* which had been prepared for service in a quarter where, in the opinion of Captain Kellett and others, she was admirably qualified, from her form, build, and fittings, to accomplish the happiest results.

Up to a late date I entertained a hope that the Board of Admiralty, which, with the kind sanction of the Noble Duke at its head, had supplied the *Isabel* with pemmican, certain other provisions, and coals, and had directed a steam tug to help her out to sea, might think it desirable to employ this good vessel in their own service, by despatching her to Behring Strait. But as this plan does not enter into the views of our naval chiefs, let us hope that they may yet think fit to employ in some way this ship, if only to carry out that additional quantity of provisions, with which she is already stored, to the Arctic squadron under Sir E. Belcher. By this plan the noble effort of Lady Franklin (who has contributed much more largely than all the subscriptions united to the outfit of the *Isabel* would be recognized), and the wishes, I venture to say, of all promoters of the expedition satisfied; for every one must know, that the shortcoming of provisions has before now been the main cause of Arctic researches being prematurely checked. Again, it may be noticed that, if so employed, the *Isabel* could, after leaving her supplies at Beechey Island, return to England this autumn with accounts of our absent explorers, and be ready for a spring voyage, if required, to Behring Strait or elsewhere.

The extraordinary excitement which has been produced by the appearance of two half-wrecked ships which were said to be seen floating south-

wards upon an ice-floe in north latitude, along the shores of Newfoundland, by persons on board the ship *Renovation*, on the 21st of April, 1851, is a manifest proof of the deep interest which is still taken in the fate of Franklin and his crews. Some navigators considered that this appearance may have been a delusion, which might easily have operated on the mind's eye of persons who for the first time saw a floating mass of ice. But I agree with naval friends who have looked into this case, that the evidence is too clear and circumstantial to allow us to doubt that the objects were vessels. We must also bear in mind that the tract to the south of St. John's is precisely that in which we know, from the excellent ice-chart of Mr. Redfield, such floating ice prevails, and occasionally in great quantities.* This author has demonstrated that very large masses of floating ice, sometimes miles long, not only abound where the *Renovation* was sailing, but extend to the south of the 40th degree of N. latitude; occurring even in the Gulf-stream, and chiefly between 45° and 55° W. longitude. As to the position of these ships, we know, from the sketches of our Vice-President Sir G. Back, how a ship forced by the irresistible pressure of the ice high on the pack, and wedged there for four months, may be, as his ship the *Terror* was, on her beam ends one day, heaved out of water another, and upright, though a wreck, upon a third. Nor does it appear that any good reason can be given why a large field or floe in which ships had been frozen up should not have so broken up, after some years perhaps of congelation, on a great scale, that it might transport the vessels to vast distances, partly imbedded in, or firmly attached to, its rough and hummocky surface; as the keel of the *Terror* was on the occasion alluded to. Any one who has seen the condition of the surface of ice on the Russian lakes, or at the mouth of a great northern river, in the spring, can easily realize the idea that ships might just as easily be transported to considerable distances as the huge blocks of stones which such floes have been known to carry. It is the last-mentioned fact which has enabled the geologist to explain how, in former periods and when our lands were submerged, colossal blocks were wafted to vast distances from their parent rocks, and dropped to the bottom of a former sea when their ice-rafts melted.

Granting that two ships were seen floating on ice, it is possible, say some persons, that they were the *Erebus* and *Terror*, which had been abandoned long ago in a far northern sea (the Polynia of the Arctic circle), and, if so, that their crews may have taken refuge on the nearest adjacent lands. In obedience to the drift, the floating ice may (they add), for aught that any one can gainsay, have made a coasting voyage unknown to man, by trending along a northern but undiscovered shore of Greenland, and then descending to Newfoundland in the great current which sets in between Greenland and Iceland. Or, taking a much more limited view, others suggest that the ice-floe with its ships may simply have been dislodged from one of the

* "On the Drift Ice and Currents of the North Atlantic, with a chart showing the position of the ice at various times."—*American Journal of Science*, vol. xlvii. p. 373.

numerous deep bays or inlets of Baffin's Bay. Not pretending to form a definite opinion on either of these hypotheses, I will only say that the barest possibility of these ships having been the *Erebus* and *Terror* (and some naval men believe it to be possible) is a strong reason for renewed exertion to discover our absent friends or their relics in the lands to which they may have repaired.* Even if it be supposed that the ships were ordinary whalers, still the fate of their crews ought if possible to be ascertained.

In the idea that any of our countrymen (if only the most active portion of them) may have been eking out an existence in polar lands, cut off from all intercourse with civilized men, we have indeed redoubled cause to make fresh efforts to exhaust the survey, and to leave no chance untried. For, when such good Arctic naturalists as Richardson and Scoresby, such an able seaman as Kellett, and such a practical explorer of snow-clad lands as Rae, coincide in the belief, that animal food sufficient to sustain life may have been found, why are we not to indulge in the hope, that some of our long-absent friends may yet be alive, and even in a latitude as far north as that of Spitzbergen, in which the Russian sailors of the last century lived, and whence three out of four were brought home in perfect health after an exile of more than six years?

On this subject, however, it is my duty to look also at the other side of the prospect, and state that some Arctic authorities entertain a different opinion. From Captain Ommanney, for example, to whom we are indebted for the delineation of a new coast-line to the south of Cape Walker, and an instructive descriptive memoir,† we learn that the lands which he traversed are very sterile, and afford little animal sustenance. On the other hand, it is clear, from the testimony of many explorers, that animals do abound in much higher latitudes than those explored by that officer; and it is well to reflect that this unequal distribution of the means of supporting life is coincident with the direction of the isothermal lines, as exhibited on the little map of Mr. Petermann. The last-mentioned gentleman and Mr. P. L. Simmonds have collected and brought before you valuable testimony to sustain the hope, that human beings may live for many years on the natural resources of parts of the Arctic regions. But here again we must fence round this bright prospect with all the conditions of the problem, and not be over sanguine. For, whilst we have a right to hope that our absent friends may, like the Russian sailors, have found another Spitzbergen, it must also be admitted, that they may have been compelled to take refuge on coasts where few animals, save seals, could be procured, whence the birds so numerous in summer would migrate during the long season of darkness and cold; and that under such untoward conditions, their energies possibly paralyzed by

* It has been recently stated that the ships seen from the *Renovation* were not housed in, as at first reported, and were not therefore in all probability Franklin's ships; but it must be recollected that the same party which took away the sails would also carry the "housing" ashore for purposes of shelter.

* Captain Ommanney's Memoir has not yet, I regret to say, been sent in for publication.

disease, we could scarcely suppose that the most hardy of the brave men could have struggled on for any length of time.

Most geographers, however, I am happy to say, cling rather, like Admiral Beaufort, Capt. W. A. Baillie Hamilton, Mr. J. Barrow, and myself to the hopeful than to the desponding side of this picture of Arctic chances. I rejoice, indeed, in presiding over a Society that does not now abandon hope any more than when the bold veteran Sir John Ross, and his nephew Sir James, who was destined so ably to explore the Antarctic seas, had been absent four years, and were quite given up by high authorities. It was then that the Royal Geographical Society flew to the rescue, and stimulated the public to effect by subscription what the British Government declined to execute as a hopeless task.

A like feeling has supported Lady Franklin, through the memorable exertions she has made, to equip and transmit the *Prince Albert* under Captains Forsyth and Kennedy, at her own expense; to contribute much to the outfit of the *Felix* under Sir John Ross, and to provide largely for the equipment and purchase of the *Isabel*. To this feeling also we owe one of the finest examples of disinterested philanthropy which history has recorded, in the conduct of Mr. Grinnell, the President of the Geographical Society of New York, who sent forth, at his own cost, an expedition of two vessels, under the command of Captain de Haven,* and which has led us to confer on that noble-minded citizen of the United States the distinction of being one of our Honorary Members.

In reviewing all that Britain has accomplished in polar researches, whether in the spirit of discovery or philanthropy, we must not, however, forget how boldly our former rivals, the Dutch, navigated in these seas. It is even asserted that their old explorers reached to within one degree of the pole. However this may have been, we know that Barentz † advanced considerably to the north, in the great sea between Spitzbergen and Nova Zembla.

It is indeed singular that this, by far the widest—indeed the only oceanic opening towards the North Pole—should in this century have been so much neglected, and that nearly all our recent efforts should have been accumulated upon the north shores of America, where every succeeding year has brought with it discoveries not of open sea, but of numerous masses of land separated from each other by comparatively narrow channels of water. Our associate Mr. Petermann has recalled public attention in a clear and emphatic manner to the great open highway leading to the North Pole. This laborious young German physical geographer, who is now naturalized amongst us, has shown that, whether we look to the ascertained outlines of the land, the range of the isothermal lines, the results of the annual

* See the clear and unpretending official report of this good officer describing his co-operation with our expeditions.

† The Hakluyt Society will soon publish the voyages of Barentz, the English translation of which, in 1609, is very scarce.

summer debacles, issuing from the mouths of the gigantic rivers of Siberia, or to the great predominance of water, and with it a milder climate, it is to be inferred that, if a steam-vessel were to be steered during the winter or spring months directly N. E. from the British Isles, she might pass into the Polar seas in a fortnight or little more without encountering any serious obstacle, and thus be soon in a position which our own ships have been struggling to reach through defiles of land-locked water encumbered by ice.

This ingenious hypothesis seems to rest on some good preliminary data; for at Bear Island, beyond North Cape (the Cherrie Island of early English navigators), my friend, the praiseworthy Norwegian geologist, Keilhau,* the author of the "Gæa Norvegica," who visited it in 1827, obtained from some seamen in Hammerfest, who passed the winter of 1823–4 upon it, certain curious meteorological data, showing the mildness of the climate in that high latitude (74° 30′), where they encountered no severe cold, and saw neither packed nor floating ice in the sea. Again, in August 1827, that very successful Arctic explorer, Sir Edward Parry, proceeded, in spite of a powerful counter-current, to the most northerly point (N. 82° 40′ 23″) ever reached in our day, and found no bottom to the sea at 500 fathoms depth, no land visible, and little ice with much rain.

This modification of climate in so northern a latitude is doubtless due to the same cause, the proximity of a great sea, as in the well-known example of the long and narrow Siberian promontory of Taimyr, explored by our former medallist Middendorff, and to which I formerly invited your attention. † In other words, it is caused by the predominance of water over land; the former tempering cold, the latter when in great masses producing it. It is then by the application of this distribution of heat and cold, which resulted in the establishment of the isothermal lines of the great philosophic geographer Humboldt, as well as by attention to the fact of the vast icy masses of the North Siberian shores being held together to the land during the winter, that Mr. Petermann ‡ has made the novel suggestion, that a winter, or rather an early spring, search should be attempted through a belt of water which is too broad to be affected by congelation; and that this effort should be carried out at a time when this sea is not rendered impassable (as it is in summer) by floating fields of ice proceeding from the Siberian shores. As an instructive map to explain this author's views has been prepared, and the project is under the consideration of the

* My eminent geological friend, Leopold von Buch, first made known to the German public, in 1846, the importance of M. Keilhau's observations in Bear Island, and deduced therefrom some important generalizations ("Trans. Berlin Acad. of Sciences.") A translation of his memoir, by Professor J. Nicol, is given in the "Journal of the Geological Society of London," vol. iii., Translations and Notices, p. 48.

† See Journ. R. Geogr. Society, vol. xv., President's Address, p. cii.

‡ Since the Address was read, Mr. Petermann has embodied his views on various Arctic topics in one pamphlet, entitled, "The Search for Franklin," with the polar chart above alluded to, &c.

authorities, it is just possible, that before our next anniversary we may hear of a steam voyage towards the North Pole and back, which may have penetrated beyond Parry's farthest north, and which shall have been executed in the ensuing winter and spring! Why might not the strong little screw-vessel, the *Isabel*, and a consort, if placed under a vigorous commander, effect such an object? or why, some sanguine persons would say, might not such an expedition even get through the Great Polar Sea, and emerge from it by Behring Strait? For, whilst much caution is required in forming an opinion on this subject, and whilst I refer you to the former partial efforts of Buchan and Franklin, as described by Beechey in 1818, and also to the fact that whalers do not resort much to that great opening, it must be recollected that the proposal of Mr. Petermann is original and untried; all our previous expeditions having been made in the summer.*

In quitting the consideration of these exciting topics, which have much occupied your attention during a large portion of the session, let me remind you that, if we are now well assured that no practicable north-west passage, as suggested by Cook and contended for by Barrow, can be detected, it is still a satisfactory reflection, that in the pursuit of an object which the last discoveries have *almost* set at rest, our countrymen have maintained pre-eminence in nautical researches, and that, in spite of great natural obstacles, they have delineated a very great amount of the earth's outline which was entirely unknown to our fathers. In comparing a correct map of the world constructed at the conclusion of the last war with one which exhibits the present state of our knowledge, we at once see the immense debt of gratitude which is due to our countrymen who have won these geographical trophies during the long peace of this century.

AUSTRALIA.

Australian Geography.—My old friend Sir Thomas Mitchell has presented to the Society a general map of the colony of New South Wales, compiled by himself and engraved by Sydney; and in calling your attention to this valuable document, I have also pleasure in seeing that additions are continually making to the more portable maps of these colonies by Arrowsmith and Wyld.

The south-western portion of this great continent has received much useful map illustration, through the labours of the Surveyor-General of Western Australia, Mr. J. Roe, and of Mr. Augustus Gregory.

The general reader has been enlivened by sparkling sketches of the

* Sir G. Beck, who was in the expedition of Buchan and Franklin, to the north of Spitzbergen, seems to think, however, that, to say nothing of darkness, the temperature would be too low in winter to admit working with ropes among the ice.

manners and habits of the colonists and natives, as recently published in the "Antipodes" of Colonel Mundy, who makes the life of an accomplished soldier in Australia or New Zealand familiar to every one.

An instructive statistical work on Australia has been published by Mr. Melville, during many years a resident in different parts of that great country.

Though less read by the public, the work of Mr. Macgillivray, the naturalist of the expedition under our lamented associate the late Captain Owen Stanley, is one of deep interest to the ethnologist, and bids us hope for excellent results on the return of the expedition recently detached to the South Pacific under Captain Denham, and to which our member Mr. Macgillivray is appointed.

This author has shown that, whilst the Australians are nearly in the lowest possible grade of human existence, they have languages more complex than any of modern Europe; these can only have been developed in a long succession of ages. His sketches of the distinctive characters of the different peoples which the expedition visited, whether Malays, Papuans, or Australians, are drawn with simplicity, truthfulness, and power.

Gold Produce of Australia.—When I first occupied this chair in 1844, and announced to you a then forthcoming work of my distinguished friend Count Strzelecki, whose collections of rocks, fossils, and whose detailed maps I had examined, I drew your attention to the remarkable coincidence between the structure of the great eastern chain of Australia, which I termed the "Cordillera" of that continent, and that of the auriferous Ural mountains, from which I had recently returned, remarking that "*as yet* no gold had been discovered in our Australian colonies." That comparison produced, it appears, however, some fruits; for in the year 1846, small specimens of gold in quartz rock having been sent from New South Wales, as resulting from what I had written, I at once urged the unemployed Cornish miners, who were about to emigrate, to prefer that colony, and there seek for gold in the débris of the older rocks of that region. This exhortation, which was printed in the Penzance newspapers, October, 1846, and also in the "Transactions of the Royal Geological Society of Cornwall," caused, I was told, a sensation in Sydney, and set other individuals to search after the precious metal; and in 1848 I received letters, dated 1847, from persons in Sydney and Adelaide quite unknown to me, who stated that they had detected gold, and that they knew where they could find much more, provided the Government would modify the mining laws, and render it worth the while of speculators really to open out mines.

Indeed, Colonel Helmersen, my associate in the Academy of St. Petersburgh, writing to me in 1846, and unaware of what I had previously printed in 1844, also compared the Australian rocks with those of the Ural. He further urged me to draw the attention of the Government of New South Wales to the probability of finding gold in the alluvia of that country; but although I then expressed my opinion very decisively in Cornwall and elsewhere, I did not feel myself entitled to address the Government until

1848, when I explained my views to Earl Grey, * then Minister of the Colonies, informing him of fresh confirmations of them from Victoria Land as well as Sydney, and referring him back to the comparison of 1844, and to the anticipation of quantities of gold-ore in 1846—both of which publications, I need not remind you, were anterior to the discovery of the Californian gold (1847). Such printed documents, followed by an official letter of November, 1848, which is registered in the Colonial Office, prove, I apprehend, that your President was the person who, by inductive reasoning, and a comparison of the rocks of two very distant countries, anticipated the production of the Australian gold; and I here record the fact, because the view would never have been promulgated had you not, gentlemen, honoured me with this chair, and thus incited me to do my duty, and show the usefulness of our science, by comparing two distant meridian chains of the earth, one of which belonged to our own country.

I must here, however, do justice to my friend and associate in the Geological Society, the Rev. W. B. Clarke, who, for a long time resident in the colony of New South Wales, played a prominent part in the discovery of the gold some years before profitable works were opened by Mr. Hargraves in 1851. Mr. Clarke states, that as early as 1841 he expressed his opinion to persons there, to whom he refers, that the colony would prove to be a "gold country." Believing in the accuracy of his declaration, I must be permitted to say, that as no one in England was made acquainted with his views, and as the first *printed* document which bears his name is dated in 1847, he will doubtless admit that the published comparative and inductive reasonings of 1844–6, by which the anticipation was arrived at *here*, were wholly irrespective of his local and unpublished conversations. In truth, no geologist who returned from Australia before the year 1847 had ever adverted to the occurrence of gold ore in these colonies.

For my own part, however, I would in no way derogate from the independent merit of Mr. Clarke, and I trust that in the colony on whose geological structure he has thrown much light, and in which he is now exploring the extension of the gold ore, he may long enjoy the credit to which he is justly entitled, for having there roused attention to the phenomenon.

The extent to which gold has been worked in our Australian colonies is to be seen generally in a compendious map, inserted in a small work on the general distribution of gold over the world, by our associate, Mr. Wyld, chiefly taken from the instructive work of M. Adolf Erman; and when new and more detailed maps are produced, which are in preparation by Mr.

* Earl Grey did not take any steps in this matter, because, as his Lordship has since informed me, he feared that the discovery of gold would be very embarrassing to a wool-growing colony. Colonel Helmersen has not printed anything on the Australian gold; but I introduced his name into my Cornish letter to Sir C. Lemon, and hence it became known in the Australian colonies.

Arrowsmith, it will be seen how this golden flood is distributed at intervals and, just as I expected, on the flanks of the main watershed, or backbone, of that continent, which, trending from north to south, bends off the west to pass to the north of Melbourne, where one of the richest accumulations has recently been detected at Mount Alexander.

It is unnecessary here to recapitulate data on which I have been dwelling for some years past: the chief inference from such fact was, that as auriferous veinstones and masses usually deteriorate downwards in the parent rock, and that their richest parts have been superficial, the most prolific goldfields are necessarily composed of that débris or drift which has been abstracted by *former great operations of nature from the surfaces of the mountains, and distributed in heaps of gravel, mud and sand, upon their sides or in the adjacent valleys.*

I have also endeavoured to show, that as gold has never been found in a notable quantity, except among the slopes of the more ancient backbones or axes of continents, and has never been derived in any quantity from secondary or tertiary strata, so the goldfields of nature are restricted to such comparatively narrow zones. When, however, we look to the vast length of the "Cordillera" of Australia, and of other ridges which may be found to be similarly constituted in that continent; and, above all, when we reflect, that no other large region of the earth has been so unoccupied by human beings acquainted with the value of the metal, it behoves us to be prepared for a considerable (though temporary) augmentation of it.

Eight years have elapsed since I spoke to you, in a former address, of the social and political effects which might be produced by new large supplies of gold, such as of Siberia, and to which I called the notice of British statesmen. But although, in the intervening years, California and Australia have let loose floods of gold, the very apprehension of which would formerly have alarmed most statists, we have yet to learn that any sensible diminution of the value of our standard metal has taken place.

Whilst as a geologist I have affirmed, from reference to experience and physical data, that, large as the supply may now be from the opening out of two great auriferous tracts previously unknown (because the regions were untrodden by civilized beings), such supplies as come from California and Australia will become exhaustible because *superficial*, just as was the case in those parts of the old world, which in their day had rich auriferous deposits. I may, indeed, now announce to you that, as far as can be ascertained, the supplies are already diminishing from two of the great sources—Siberia having given considerably less than in previous years, whilst California, the produce of which had been run up to a very large amount through the indomitable energy of the Anglo-Saxon race, is likely to fall short (if I am not misinformed) this year by some millions sterling.

Though incompetent to speak of the political, social, and statistical effects of the remarkable golden shower of this country, I may put you in possession of words which proceeded from a master-mind, now no more. In

a letter addressed to myself in March, 1850, the late Sir Robert Peel, after alluding to an evening discourse I had delivered at the Royal Institution, thus proceeded:—"On the 6th of May 1844, in bringing in the Bank Charter, I adverted to the rapid increase of the annual supply of gold from mines within the dominions of the Emperor of Russia, and recommended those who wished for a relaxation of the standard of value in order to benefit the debtor, well to consider whether their objects might not be effected by natural causes—the decreasing relative value of gold in consequence of more abundant supply, without the aid of legislative intervention. Your arguments," he added, "are powerful to show that there is no probability (risk I should say) of precipitate and violent disturbance. *It takes a long time, and a great disproportion in the amount of supply, to affect the relative value, throughout the world, of two such articles as gold and silver.* The united influence of Siberia and California will, however, I think, justify my inference of 1844, that there is a tendency towards diminished value on the part of gold. An extraordinary increase in the supply of both gold and silver might concurrently take place, not affecting their relative value between each other, but affecting the price of all other commodities estimated with reference to the precious metals, and the interest of debtor and creditor."

The truth of the sentiment which is italicized has been fully borne out by the events which have followed since the great statesman was taken from us. Those events have also concurred in showing the improbability of any precipitate or violent disturbance being produced by the new discoveries.

On the Influence of Suggestion in Modifying and Directing Muscular Movement, independently of Volition.

By William B. Carpenter, M.D., F.R.S., &c.

(Notices of Meetings.—Royal Institution of Great Britain.)
1851–2.

Public attention has recently been so much attracted to a class of phenomena, which has received the very inappropriate designation of *Electro-Biological*, or simply *Biological*, and so much misapprehension prevails regarding their true nature and import, that it becomes the Physiologist to make known the results of scientific investigation, directed in the first place towards the determination of their genuineness, and in the second to the elucidation of the peculiar state of the nervous system on which their production depends.

With regard to the genuineness of the phenomena themselves, the

Lecturer stated that he could entertain no doubt whatever, since they had been presented to himself and to other scientific enquirers by numerous individuals, on whose honesty and freedom from all tendency to deceive themselves or others implicit reliance could be placed. But from the account commonly given of these phenomena,—to the effect that the *will* of the "biologized" subject is entirely subjected to that of the operator,—he entirely dissented; and believed that he should be able to show that the state in question is essentially one of *reverie*, in which the voluntary control over the current of thought is entirely suspended, the individual being for the time (so to speak) a mere *thinking automaton*, the whole course of whose ideas is determinable by suggestions operating from without. The "biologized" individual cannot get rid of any notion with which he thus becomes possessed, by any effort of his own; because the abeyance of his voluntary power alike prevents him from directing the current of his thoughts into another channel, and from having recourse to his ordinary experience for the correction of its fallacies; and so long as he is under its domination, all his conversation and actions are nothing else than an expression of it. A condition very similar to this is often seen in that form of artificial somnambulism which is termed "hypnotism," by Mr. Braid, and less frequently in natural somnambulism.*

But it is the peculiar feature of the "biological" state, that the subject of it is still awake, that he has generally the use of all his senses, and that he has in most cases a perfect recollection of what has taken place, when he returns to his ordinary state of mental activity, though sometimes the recollection does not extend to particulars.

All the phenomena of the "biologized" state, when attentively examined, will be found to consist in the occupation of the mind by the *ideas* which have been suggested to it, and in the influence which these ideas exert upon the actions of the body. Thus the operator asserts that the "subject" cannot rise from his chair, or open his eyes, or continue to hold a stick; and the "subject" thereby becomes so completely possessed with the fixed belief of the impossibility of the act, that he is incapacitated from executing it, *not* because that his will is controlled by that of another, but because his will is in abeyance, and his muscles are entirely under the guidance of his ideas. So again, when he is made to drink a glass of water, and is assured that it is coffee, or wine, or milk, that assurance, delivered in a decided tone, makes a stronger impression on his mind than that which he receives through his taste, smell, or sight; and not being able to judge and com-

* In natural somnambulism, the mind is generally engrossed by some "dominant idea" of its own, and cannot be directed by external suggestions, except such as may be in harmony with it. There are numerous instances on record, however, (among the best known of which is that of the Officer who served in the expedition to Louisburgh in 1758, and at whose expense his comrades were accustomed to amuse themselves, as narrated by Dr. James Gregory), in which the current of thought and the course of action of a natural somnambulist have been entirely governed by the suggestions of those around.

pare, he yields himself up to the "dominant idea."* Here, again, we perceive that it is not really the *will* of the operator which controls the *sensations* of the subject; but the *suggestion* of the operator which excites a corresponding *idea*, the falsity of which is not corrected, simply because the mind of the subject, being completely engrossed by it, cannot apprehend the truth less forcibly impressed on it through his own senses. Not only muscular movements, but other bodily changes, attest the reality of this domination; thus a biologized subject may be brought to feel the apartment so intensely hot, that a perspiration breaks out upon his skin; or he may be so persuaded of its coldness, that he forthwith begins to shiver; and sleep may often be induced, by assuring him that in a few minutes he will be obliged to give way to it. In a case witnessed by the Lecturer, a lady to whom chloroform had been twice administered (so that she was aware of the mode of its action) was made to believe that she was again inhaling it; she soon passed into the usual insensibility, and remained perfectly unconscious for a few minutes, after which she came to herself in the manner she would have done if she had really been under the influence of chloroform.

The same general statement applies to what has been designated as "control over the memory." The subject is assured that he cannot remember the most familiar thing, his own name for example; and he is prevented from doing so, not by the will of the operator, but by the conviction of the impossibility of the mental act, which engrosses his own mind, and by the want of that voluntary control over the direction of his thoughts, which alone can enable him to *recal* the desiderated impression. And the abolition of the sense of personal identity,—Mr. A. believing himself to be Mrs. B., or Mrs. C. believing herself to be Mr. D., and acting in conformity with that belief,—is induced in the same mode; the assurance being continually repeated, until it has taken full possession of the mind of the "subject," who cannot so direct his thoughts as to bring his familiar experience to antagonize and dispel the illusive idea thus forced upon him.

Now almost every one of these peculiar phenomena has its parallel in states of mind whose existence is universally admitted. Thus the complete subjection of the muscular power to the "dominant idea" is precisely what is experienced in *nightmare;* in which we are prevented from moving so much as a finger, notwithstanding a strong desire to do so, by the conviction that the least movement is impossible. The misinterpretation of

† It is very curious to observe, in some instances, the perplexity arising from the contrariety between the opposing sensory impressions. The mind seems unable to reconcile this contrariety, and yields itself up to the impression which is most strongly felt. Sometimes it is convinced by the repeated assurances of the operator, so long as the *taste* alone is opposed to them, but attaches a superior importance to the indications of *sight;* in other individuals, again, the indications of sight may be put aside, and yet the "subject" cannot be made to believe what is in opposition to his sense of taste. There are some individuals who can never be thus played upon, notwithstanding that their muscular movements and their purely mental conceptions are completely amenable to this kind of direction.

sensory impressions is continually seen in persons who are subject to *absence of mind*, who make the most absurd mistakes as to what they see or hear, taste or feel, in consequence of the pre-occupation of the mind by some train of thought, which renders them unable rightly to appreciate the objects around them. In such persons, too, the memory of the most familiar things,—as the absent man's own name, for example, or that of his most intimate friend,—is often in abeyance for a time; and it requires but a more complete obliteration of the consciousness of the past, through the entire possession of the mind by the intense consciousness of the present, to destroy the sense of personal identity. This, indeed, we often do in effect lose in ordinary *dreaming* and *reverie*. The essential characteristic of both these states, as of the "biological" condition, is the suspension of voluntary control over the current of thought, so that the ideas follow one another *suggestively;* and, however strange or incongruous their combinations or sequences may appear, we are never surprised at them, because we have lost the power of referring to our ordinary experience. It is well known that the course of ordinary dreams is often determined by impressions received through the organs of sense, although the individual may not be conscious of them *as such;* and those who are prone to reverie are well aware that the direction of their thoughts depends in many instances, not merely upon the previously existing associations between their ideas, but upon the excitement of new ideas by external impressions.

There is one phenomenon of the "biological" state, which has been considered pre-eminently to indicate the power of the operator's will over his subject; namely, the induction of sleep, and its spontaneous determination at a given time previously ordained, or by the sound of the operator's voice, and that only. It is well known that the *expectation* of sleep is one of the most powerful means of inducing it, especially when combined with the withdrawal of the mind from every thing else which could keep its attention awake; both these conditions are united in an eminent degree in the state of the biologized subject, whose mind has been possessed with the conviction that sleep is about to supervene, and is closed to every source of distraction. Nor need the waking at a given time, or upon a given sound, (and upon that only), be accounted at all more strange; for it is a matter of familiar experience, that this is often determined, in the case of an ordinary sleeper, by the impression under which he passes into unconsciousness; the fixed intention to awake at a certain hour being productive of the exact consequence; and the habit of attention to a particular sound, as that of a clock, bell, voice, &c., causing the sleeper to awake upon the slightest provocation from it, although his slumbers are not broken by noises of far greater intensity.

Thus, then, however strange the phenomena of the "biological" state may at first sight appear, there is not one of them, which, when closely scrutinized, is not found to be essentially conformable to facts whose genuineness every physiologist and psychologist is ready to admit. And the chief marvel is, that a state in which these phenomena are so easily and constantly producible, should be capable of being induced by so simple a

process as that of gazing for a time at a small fixed object at arm's length from the eyes.*

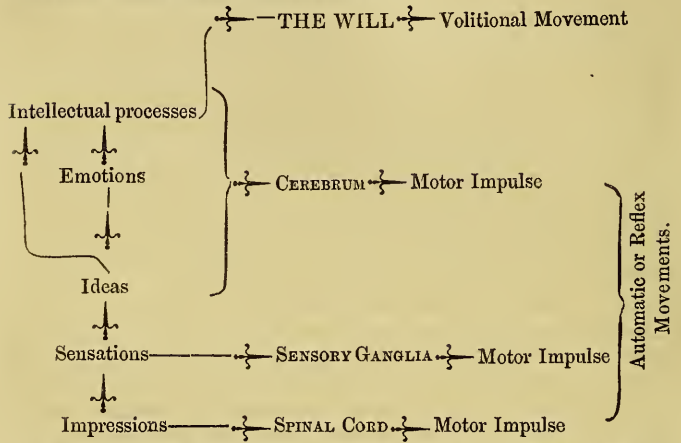
It is not, however, in any large proportion of individuals, that this state can be induced; probably not more than one in twenty, or at most one in twelve. Males appear equally susceptible of it with females; so that it cannot be fairly set down as a variety of "hysterical" disorder. Generally speaking, those who have most of the power of voluntary abstraction are most easily affected in this mode; more especially if, at the same time, they are of an excitable or imaginative temperament.

It now remains to enquire, whether any such Physiological account can be given of this state, as shall enable us to refer it to any of the admitted laws of action of the Nervous system. This, the Lecturer stated, was the point which he was most desirous of elucidating; and in order to prepare his auditors for the reception of his views, he gave a brief explanation of those phenomena, of "reflex" action (now universally recognized by Physiologists), in which impressions made upon the nervous system are followed by respondent automatic movements. Such movements have hitherto been distinguished into the *excito-motor*, which are performed without the exciting impression being necessarily felt, through the instrumentality of the Spinal Cord and the nerves connected with it; and the *sensori-motor*, in which sensation necessarily participates, the respondent motions not being executed unless the impressions are felt, and their instrument being the Chain of Sensory Ganglia (collectively constituting the "sensorium") which lies between the Spinal Cord and the Cerebrum, and is intimately connected with both. The automatic movements of breathing and swallowing, which continue during a state of profound insensibility, are examples of the former group; whilst the start upon a loud sound, the closure of the lids to a flash of light, or the sneezing induced by dazzling of the eyes, as well as by irritation in the nasal passages, are instances of the latter. The whole class of purely *emotional* movements may be likened to these; for in so far as they are involuntary, and depend upon the excitation of certain states of mind by external impressions, they must be considered as "reflex" in the general sense of that term.

Now the usual *modus operandi* of sensations is to call forth *ideas* in the mind; and these ideas, associated or not with emotional states, become the subjects of intellectual processes, which result at last in a determination of the Will. The movements which we term *voluntary* or *volitional* differ from the emotional and automatic, in being guided by a distinct conception of the object to be attained, and by a rational choice of the means employed. And so long as the Voluntary power asserts its due predominance, so long can it keep in check all tendency to any other kind of action, save such as ministers directly to the bodily wants, as the automatic movements of breathing and swallowing.

* The "Electro-Biologists," as they term themselves, at first maintained that a wonderful virtue resided in the little disk of copper with a zinc centre, to which they directed the gaze of their "subjects." It is now universally admitted, however, that *any* object which serves as a *point d'appui* for the fixed gaze is equally efficacious.

The *Cerebrum* is universally admitted to be the portion of the nervous system which is instrumentally concerned in the formation of ideas, the excitement of the emotions, and the operations of the intellect; and there seems no reason why it should be exempted from the law of "reflex action" which applies to every other part of the nervous system.* And as we have seen that the *emotions* may act directly upon the muscular system through the motor nerves, there is no *a priori* difficulty in believing that *Ideas* may become the sources of muscular movement, independently either of volitions or of emotions.—The relations of these different modes of action of the nervous system, and the place which this *ideo-motor* form of "reflex" operation will hold in regard to the rest, will be made more apparent by the following tabular arrangement.



Now if that ordinary *upward* course of external impressions,—whereby they successively produce sensations, ideas, emotions, and intellectual processes, the will giving the final decision upon the action to which they prompt,—be anywhere interrupted, the impression will then exert its power in a *transverse* direction, and a "reflex" action will be the result. This is well seen in cases of injury to the Spinal Cord, which disconnects its lower portion from the sensorium without destroying its own power; for impressions made upon the lower extremities then excite violent reflex actions, to which there would have been no tendency if the current of nervous force could have passed upwards to the Cerebrum. So, if sensations be prevented by the state of the Cerebrum from calling forth ideas through its instrumentality, they may react upon the motor apparatus in a manner which they would never do in its state of complete functional activity. This the Lecturer maintained to be the true account of the mode in which the locomotive movements are maintained and guided in states of profound abstraction, when the whole attention of the individual is so com-

* To Dr. Laycock is due the credit of first extending the doctrine of reflex action to the Brain.

pletely concentrated upon his own train of thought, that he does not *perceive* the objects around him, although his movements are obviously guided by the impressions which they make upon his sensorium. And he adverted to a very remarkable case, in which the functional activity of the Cerebrum seemed to have been almost entirely suspended for nearly a twelvemonth, and all the actions of the individual presented the automatic characters of consensual and reflex movements.

On the same grounds, it seems reasonable to suppose that when *ideas* do not go on to be developed into emotions, or to excite intellectual operations, they, too, may act (so to speak) in the transverse direction, and may produce respondent movements, through the instrumentality of the Cerebrum; and this will of course be most likely to happen, when the power of the Will is in abeyance, as has been shown to be the case in regard to the direction of the thoughts, in the states of Electro-biology, Somnambulism, and all forms of Dreaming and Reverie. Here the movements express the ideas that may possess the mind at the time; with these ideas, emotional states may be mixed up, and even intellectual operations may be (as it were) automatically performed under their suggestive influence. But so long as these processes are carried on without the control and direction of the Will, and the course of thought is entirely determined by suggestions from without, (the effects of which, however, are diversified by the mental constitution and habits of thought of the individual), such movements are as truly automatic as are those more directly prompted by sensations and impressions, although originating in a more truly *psychical* source. But the automatic nature of the purely emotional actions can scarcely be denied; and as it is in those individuals in whom the intellectual powers are the least exercised, and the controlling power of the Will is the weakest, that the Emotions exert the strongest influence on the bodily frame, so may we expect Ideas to act most powerfully when the dominance of the Will is for the time completely suspended.

Thus the *ideo-motor* principle of action finds its appropriate place in the physiological scale, which would, indeed, be incomplete without it. And, when it is once recognized, it may be applied to the explanation of numerous phenomena which have been a source of perplexity to many who have been convinced of their genuineness, and who could not see any mode of reconciling them with the known laws of nervous action. The phenomena in question are those which have been recently set down to the action of an "Od-force," such, for example, as the movements of the "divining-rod," and the vibration of bodies suspended from the finger; both which have been clearly proved to depend on the state of *expectant attention* on the part of the performer, his Will being temporarily withdrawn from control over his muscles by the state of abstraction to which his mind is given up, and the *anticipation* of a given result being the stimulus which directly and involuntarily prompts the muscular movements that produce it.

W. B. C.

Note on the Influence of a Tropical Climate on the Wool of the Sheep.

By John Davy, M.D., F.R.S., L. & E., &c.

(Ed. New Phil. Journal.)

The sheep of Barbadoes, originally from an English stock, affords a striking example of the change that may be effected by climate, in a few generations, in the character of the hair of an animal. In that Island instances are frequently to be seen of sheep in which hair has so taken the place of wool (using the terms in their usual acceptation), that were it not for the form of the animals,—and that is not altogether free from change, it would be impossible to suppose that they belonged to the same species as our English sheep.

Considering the subject of such a change not undeserving of attention, I have examined two specimens of hair procured for the purpose, one from a sheep two years old, the other from one about a year old, which were obligingly sent me, at my request, by a friend, a resident.

Both were nearly of the same colour, a light reddish-brown, and were nearly of the same length, that is, the individual hairs,—varying from about an inch to an inch and a-half. The hair of the three-year old was coarser than that of the one-year old; it consisted chiefly of harsh fibres slightly tortuous, each about 180th of an inch in diameter,—some cylindrical, others more or less flattened, all tapering towards a point at their distal extremity. The hair of the one-year old consisted of coarse and fine fibres in about equal portions; the one about 363d of an inch in diameter, the other about 1333d of an inch; the former resembling the hair of the older sheep, the latter having the appearance of wool, and that both in its fineness and general aspect, whether seen with the naked eye or under the microscope. The presence of a portion of wool mixed with the hair of the younger sheep accords, I may remark, with the belief of my friend by whom the samples had been sent, viz., "that all the very young lambs of the island have wool, which gradually pass into hair as they grow older." This, he writes, he thinks is the fact, though he cannot say positively that it is so, not having attended sufficiently to the subject.

Interesting in itself, as exemplifying how Nature fits an animal, the native of a cold climate, by a change in its clothing, to endure without discomfort the heats of a tropical region it is not, as it appears to me, without value in its analogical applications.

Though so much changed in appearance as is the wool in passing into hair, the one differs as little from the other in intimate structure as the hair of the woolly-headed African does from the straight, lank hair of the North

American Indian, or as this does from the hair of the European. Examined under a high magnifying power, and with care, the difference in the qualities of all these kinds of hair, whether of the sheep or of man, colour apart, appear to be merely in degree. The wool of the sheep and its hair are both solid,—both exhibit the same transverse markings, the one strongly, the other feebly; and so of their other properties. The same may be said of the hair of the several varieties of the human race. And keeping to the analogy, with which all experience is in accordance, we may confidently conclude, that provident Nature has not been less careful of man than of the brute, and what is peculiar in the hair of each variety of the human race, as in the colour of the skin of each, is to be viewed rather as an excellence, connected with climate, and the effect of the adapting power of climate, than in any instance as a deformity or an unseemly defect.

Lesketh How, Ambleside,
6th March, 1852.

Sir Charles Lyell on Progressive Geological Development.

Sir Charles Lyell in a lecture read at Ipswich a short time ago, on Progressive Development, concluded by explaining the theory which he had advocated in his works, in opposition to that of progressive development. He believed that there had been a constant going out and coming in of species, and a continual change going on in the position of land and sea, accompanied by great fluctuation in climate; that there had been a constant adaptation of the vegetable and animal creations to these new geographical and climatal conditions. At the present moment we found contemporaneously a marsupial fauna in Australia, and mammalia of a different and higher grade in Asia and Europe; we also found birds without mammalia in New Zealand, reptiles without land quadrupeds in the Galapagos Archipelago, and land quadrupeds without reptiles in Greenland. In like manner, in successive geological eras, certain classes, such as the reptiles, may have predominated over other vertebrata throughout wide areas; but there is no evidence that the adaptation of the fauna, as above explained, had been governed by any law of progressive development. In those classes of the invertebrata which were best known, and fully represented in a fossil state at all geological periods, the oldest or Silurian fauna was as highly developed as the corresponding fauna in the recent seas. Our ignorance of the inhabitants of the ancient lands was the chief cause of our scanty acquaintance with the highly-organized beings of remote epochs.—(*Literary Gazette*, No. 1824, p. 17.)

On the Recent Earthquake felt at Adderley, in a Letter to Robert Chambers, Esq.

By Richard Corbett, Esq.

(Ed. New Phil. Journal.)

At half-past four o'clock this morning, (Nov. 7, 1852) railway time, we were visited by a really smart shock of an earthquake. Our household consists of twenty-two persons, eighteen of whom were fully alive to it, and all more or less alarmed. Having myself felt a shock in this house, July 1832, I was instantly aware of what was taking place. A rumbling, heavy noise, which seems to have awakened many who were asleep, shortly preceded the shock—this was my case; the sensation was that of being rocked in a bed.

From all that I can collect, it is my belief that the shock passed from west to east, and at present we have reason to suppose it was confined to a very narrow line. Several of our villagers were much shaken and alarmed. The noise must have been considerable, as a very deaf person heard it, and resembled that made by a waggon going over pavement.

The Atmosphere was perfectly dead as described—not the slightest movement in the air, and very warm. On Friday last, we had a tremendous thunder-storm, and large pieces of ice. I could rather imagine that there is some peculiarity in our substrata here, for since 1775 or 1776 we have had three very complete shocks of earthquake in this locality. We stand upon the edge of the lias, and there has been very near to us a most extensive subsidence, forming a valley of unknown depth between the face of the lias and that of the new red sandstone, which cross out at the distance of a mile and a-half from each other. The intermediate valley is filled with northern drift, in which I have bored ninety feet, still in the drift.