

bracketed with that of Givet, we must also place there the limestone of Frasné, as was done by Dumont. But M. Malaise replies that Dumont's classification was founded on mere lithological considerations, and that we can now trace palæontological differences among these subdivisions. It is interesting to observe among his fossils from the Upper Devonian Psammites du Condroz some of the forms which occur in the Barnstaple and Marwood beds of Devonshire, with remains of fishes (*Holoptychius nobilissimus*) of the Upper Old Red Sandstone of Scotland, and of ferns (*Paleopteris Hibernica*) identical with those of Kiltorcan in Ireland.

**GEOLOGY AND PHYSICAL GEOGRAPHY OF THE ARALO-CASPIAN BASIN.**—The veteran geologist Count von Helmersen last year presented to the Imperial Academy of Sciences of St. Petersburg an interesting communication relative to the geological changes which have taken place within tertiary and recent times in the remarkable depression in South-Eastern and Asiatic Russia. Considerable activity has for some years past prevailed among Russian officials in regard to railway communication with the new acquisitions in that part of the empire. In June, 1877, the Grand Duke Nicholas placed himself at the head of an expedition which started from Orenburg with the view of exploring the shortest railroad route to Tashkend—the chief point in the central area of Russia in Asia. During the progress of this expedition a sketch-geological map was constructed and a collection of specimens was made which, carefully labelled and accompanied with notes, were sent to Count von Helmersen, whose life-long acquaintance with Russian geology enables him to make the data thus supplied tell a connected and interesting story. He points out that a much larger area of Southern Russia and adjoining lands was covered by the sea in Jurassic than in Cretaceous times; that the expanse of salt water was further diminished in the Eocene and Miocene, and still more in the Pliocene and Post-pliocene periods, and that it is visibly decreasing now in the remnants of it left in the Aralo-Caspian basin. That this should not be regarded as a mere local phenomenon he thinks to be made clear by well-known facts in Northern Russia and the surrounding regions. In Siberia, for instance, the shells of molluscs still living in the Arctic Sea are found southwards to a distance of 700 versts (nearly 500 English miles) from the northern coast, and all round the Baltic recent marine shells are found up to heights of sometimes 600 feet above the present sea-level. Whether this retreat of the sea is to be explained by a general subsidence of the ocean or an elevation of the land, or by both causes combined is, he believes, a question which still awaits solution for the whole northern hemisphere, though it has been studied by so many observers from the times of Linnæus and Celsius down to our own. After the floor of the Miocene sea had been in large measure raised into land, the United Aralo-Caspian Sea must have been connected with the Black Sea, and must have had the form of a large arc, of which the vertex passed through the country of the Turcomans and Khiva, and of which the eastern limb stretched northwards beyond the present Aral Sea. It has been commonly supposed that during some part of the later Tertiary or Post-Tertiary periods a connection existed between this united Aralo-Caspian Sea and the Arctic Ocean. But the Count holds that for this belief there is no proper foundation. At the eastern base of the Ural Mountains, he asserts, there are in the superficial deposits no vestiges of any living species of marine shells. The mollusca cited by Pallas and others from the plains of Western Siberia are all referable to freshwater species. With regard to the probable cause of the subsidence of the level of the Caspian, Count von Helmersen believes that it is to be sought in the gradual sinking of the ground. In the deeper southern half of the Caspian, notably about Derbend and Baku such a sinking is actually proved. Not there only, but over the area of the sea itself, as far as the island Tscheleken, on the eastern shore, an enormous quantity of carburetted hydrogen escapes from the ground, and has perhaps been doing so for thousands of years. The area over which this takes place loses in substance, the ground gets looser, and is unable to withstand the great pressure of the water of a deep sea and of the superincumbent rocks. It is consequently pressed together, and sudden in-falls sometimes occur. The wide extent of the area which supplies the gas and naphtha emanations of the Caspian may be understood from the statement that even as far north as Astrakhan carburetted hydrogen gas instead of water has come up in Artesian borings. But besides this subterranean cause of diminution the Count is of opinion that the facts indicate an absolute

decrease in the waters of Central Asia. Though the dwindling down of the Miocene and Post-miocene seas gives no certain proof of such a decrease, yet the desiccation of the rivers of the Steppes and the drying up of the lakes point to a change of this nature. The author instances the rivers Sârafsham, Emba, and Irgis, and all the streams descending from the north towards the Lake Balkash. This lake is fed only from the mountainous country lying to the south. Everywhere all over the vast Steppes and across into Persia and Afghanistan ancient wide lakes are now represented by greatly diminished sheets of water, which the rivers in many cases are unable to reach, as their currents are gradually lost in the wastes. An interesting practical question is connected with these discussions. Is it possible to form a continuous water-way from St. Petersburg, by the Volga, Caspian, and Oxus, to Khiva or the borders of Bokhara? Could the ancient channel of the Usboi again be filled with water so as to afford a route from the Caspian eastward? This matter is being investigated by an expedition sent out for the purpose. Count von Helmersen, however, believes that the desiccation of the Usboi is only part of the vast continental diminution of rainfall and water-supply, and that the artificial restoration of that channel is impossible. Still it is difficult sometimes to define what is impossible to modern engineering skill.

### GEOGRAPHICAL NOTES

As an example worthy of being followed by our own and other geographical societies, we call attention to the "Memorie della Società Geografica Italiana," vol. ii., parte prima (Rome, 1880), which is the first part of a volume intended to be dedicated entirely to the zoological results of the Italian expedition to equatorial Africa, under the command of the Marquis Antinori, whose portrait serves for frontispiece. It is prefaced by a communication from the Secretary of the Society (Sig. G. della Vedova), giving an itinerary of the expedition, and in connection with this there is a very excellent map showing the route. As is well known, the expedition principally explored the kingdom of Schoa, immediately south of Abyssinia—a district of which we have heard a good deal lately in connection with Egyptian politics, and of which we shall no doubt hear a good deal more. We have here an enumeration of the lepidopterous insects of the expedition, drawn up by M. Charles Oberthür, of Rennes, illustrated by a folded plate, apparently carefully executed after the manner of lepidopterists, on which eight presumably new species are represented. The list of known species shows but little of the palæartic element; this has already become dissipated, and we enter upon African ground as such; but the species captured were conspicuous, and include several of extremely wide distribution. A note explains that this part is not absolutely original, and that it also appears in the "Annali del Museo Civico di Storia Naturale di Genova," vol. xv., and the introduction indicates that the whole of this zoological volume will receive attention from the naturalists on the staff of, or in connection with, the now renowned Genoa Museum.

At the meeting of the Geographical Society on Monday evening the Rev. Chauncy Maples, of the Universities' Mission, read a paper on Masasi and the Rovuma district of East Africa. Masasi appears to be the name of a district rather than of a town, lying in about 11° S. lat. and 38° E. long., and some 120 miles south-west from Lindi on the coast; it consists of four mountains lying east and west, and rising out of a dense forest. The station of the Universities' Mission, which was formed in 1876, is situated at the western extremity of the region, and to their west again a vast forest stretches away towards Lake Nyassa. In describing the nature of the route to Masasi, Mr. Maples took occasion to remark that if a road should ever be constructed to connect Lindi with Lake Nyassa, it would have to pass along the valley of the Ukeredi, which presents no engineering difficulties. A noteworthy feature of the Masasi district is its great fertility; the cassava attains an enormous size, and the rice, &c., grown are famous for miles round. The water is strongly charged with iron, and salt is obtained in large quantities from the moist ground under the hills. Ironstone is common, and extensively worked. The missionaries have introduced several kinds of fruit, and intend to try wheat. Mr. Maples afterwards described a journey which he made in November, 1877, to the valley of the Rovuma River and the Makonde country. Throughout his paper he furnished many interesting particulars respecting the tribes inhabiting the country between the coast and Lake Nyassa.

THE Naples correspondent of the *Daily News* states that a plan has been proposed for an Italian Antarctic expedition, to leave Genoa not later than May, 1881, touch at Monte Video, Terra del Fuego, Falkland Islands, and the South Shetland Islands, remain in the Antarctic region two winters for the purpose of scientific investigation and exploration, making use of the period during which the ice is firm for sledge excursions, and return, touching at Hobart Town or Capetown, to Naples. It is calculated that the sum required will not exceed 600,000 lire. The number of persons on board not to be more than forty, part of them being selected from the Italian Royal Navy, part from the Italian whale-fishers who frequent the Southern Seas.

It is announced that two French explorers, MM. Wallon and Guillaume, have been assassinated while ascending the River Tengung, in Northern Sumatra.

THE American Society of Civil Engineers have issued, in pamphlet form, speeches delivered before it in discussing Mr. A. G. Manocal's paper on interoceanic canal projects.

### SCIENTIFIC SERIALS

*Bulletin de l'Académie Royale des Sciences de Belgique*, No. 2, 1880.—On the discovery by Prof. Scacchi, of Naples, of a new simple substance in the lava of Vesuvius, by M. Stas.—A word on some cetaceans which perished on the coasts of the Mediterranean and the west of France during 1878 and 1879, by M. van Beneden.—Researches on the relative intensity of the spectral lines of hydrogen and nitrogen in relation to the constitution of nebulae, by M. Fievez.—Note on certain covariants of binary algebraic forms, by M. le Paige.

*Journal de Physique*, March.—Phenomena called hydro-electric and hydromagnetic; fundamental theorems and their experimental demonstration, by Prof. Bjerknes.—Specific heats and fusion points of various refractory metals, by M. Violle.—Magnetisation of liquids (second part) by M. Ziloff.—Areometer giving the density of solid substances, by M. Buignet.—Application of the telephone to electric and galvanic measurements, by Herr Wietlisbach.

*Rivista Scientifico industriale*, No. 3.—Influence of surface-impurity on areometric measurements, by Prof. Marangoni.—On the nature of the electric current; considerations and experiments, by Prof. Magna.

No. 4.—On two new species of parasite crustaceans, by Prof. Richiardi.—Fossiliferous caverns discovered at Cucigliana, and fossil remains belonging to the genera *Hyæna* and *Felis*, by S. Acconci.—Aspirators and compressors, by Prof. Marangoni.—New system of electric illumination, by S. Milani.—Ammonites and belemnites found in the neighbourhood of Narni, by S. Terrenzi.

*Atti della R. Accademia dei Lincei*, February.—The Fierasfer; studies on the systematic anatomy and biology of the Mediterranean species of that genus, by Dr. Emery.—Comparative researches on the structure of the nervous centres of vertebrata, by Dr. Bellonci.—The living mollusca of Piedmont, by S. Lessona.—On the action of cold and heat on the human blood-vessels, by Dr. de Paoli.—On the first phenomena of development of *Salpa*, by S. Todaro.—Geological notes on the environs of Civita Vecchia, by S. Meli.—On the vibrations of isotropic elastic bodies (prize memoir), by Prof. Cerruti.

### SOCIETIES AND ACADEMIES

#### LONDON

**Mathematical Society**, April 8.—C. W. Merrifield, F.R.S., president, in the chair.—Mr. J. Barnard was elected a Member, and Mr. T. Olver Harding admitted into the Society.—The following papers were read:—A (presumed) new form of the equations determining the foci and directrices of a conic whose equation in Cartesian co-ordinates is given, by Prof. Wolstenholme.—The application of elliptic co-ordinates and Lagrange's equations of motion to Euler's problem of two centres of force, by Prof. Greenhill.—Theorems in the calculus of operations, by Mr. J. J. Walker.—On the equilibrium of cords and beams in certain cases, by Mr. W. J. Curran Sharp.—On steady motion and vortex motion in an incompressible viscous fluid, by Mr. T.

Craig.—On functions analogous to Laplace's functions, by Mr. E. J. Routh, F.R.S.

**Zoological Society**, April 6.—Prof. W. H. Flower, F.R.S., president, in the chair.—The Secretary read some extracts from letters which he had received from Mr. W. A. Conklin, of New York, relating to the birth of an elephant which had lately taken place in a travelling menagerie at Philadelphia.—Prof. T. H. Huxley, F.R.S., read a paper on the distinctive characters of the species of the genus *Canis*, as shown in certain points of the structure of their skulls and in the proportions of their teeth.—Dr. Francis Day read a paper on the fishes of Afghanistan, based principally upon a collection which had been made for him in the highlands of Kelat and Quetta, by Dr. Duke.—A communication was read from Prof. Julius von Haast, F.R.S., containing a description of a specimen of a rare Ziphioid Whale (*Epiodon nova-zealandæ*), which had been cast ashore at New Brighton, New Zealand, in July, 1878.

**Geological Society**, March 24.—Robert Etheridge, F.R.S., president, in the chair.—H. T. Burls, Paramaribo, Dutch Guiana; John Allen McDonald, and Rev. Thomas Edward Woodhouse, B.A., were elected Fellows of the Society.—The following communication was read:—The newer Pliocene Period in England.—Part I. Comprising the Red and Fluvio-marine Crag and Glacial Formations, by Searles V. Wood, jun., F.G.S. The author divided this part of his subject into five stages, commencing with—Stage I. The Red Crag and its partially fluvio-marine equivalent. The Red Crag he regards as having been a formation of banks and foreshores mostly accumulated between tide-marks, as shown by the character of its bedding. The southern or Walton extremity of this formation, which contains a molluscan fauna more nearly allied to that of the Coralline Crag than does the rest of it, became (as did also the rest of the Red Crag south of Chillesford and Butley) converted into land during the progress of the formation; while at its northern or Butley extremity the sea encroached, and an estuary extending into East Norfolk was also formed, during which geographical changes a change took place in the molluscan fauna, so that the latest part of the Red Crag proper and the earliest part of the fluvio-marine (both containing the northern species of mollusca and those peculiar forms only which occur in older glacial beds) alike pass up without break into the Chillesford sand and laminated clay which form the uppermost member of the formation. He also regards the principal river of this estuary as flowing into it from North Britain, through the shallow preglacial valley of chalk, in which stands the town of Cromer, and in which the earlier beds of Stage II. accumulated in greatest thickness. The forest and freshwater beds, which in this valley underlie the beds of Stage II., he regards as terrestrial equivalents of the Red Crag; and having observed rolled chalk interstratified with the base of the Chillesford clay in Easton-Bavent cliff, he considers this to show that so early as the commencement of this clay some tributary of the Crag river was entered by a glacier in the Chalk country, from which river-ice could raft away this material into the estuary. He also regards the copious mica which this clay contains as evidence of ice-degradation in Scotland having contributed to the mud of this river. In Stage II. he traced the conversion of some of this laminated clay, occupying sheet 49 and the north-east of sheet 50 of the Ordnance map, into land, the accumulation against the shore of this land of thick shingle-beaches at Halesworth and Henham, and the outspread of this in the form of seams and beds of shingle in a sand originally (from its yielding shells in that region) called by him the Bure-valley bed, and which Prof. Prestwich recognised under the term "Westleton Shingle." As the valley of the Crag river subsided northwards as the conversion of this part of the Chillesford clay into land occurred, there was let in from the direction of the Baltic the shell *Tellina balthica*, which is not present in the beds of Stage I. The formation thus beginning he traced southwards nearly to the limit in that direction of the Chillesford clay about Chillesford and Aldboro'. The Cromer Till he regards as the modification of this formation by the advance of the Crag glaciers into the sea or estuary where it was accumulated, such advance having been due partly to this northerly subsidence, but mainly to the increase of cold. Then, after describing a persistent unconformity between this Till and the Contorted Drift, from the eastern extremity of the Cromer cliff (but which does not appear in the western) to its furthest southern limit, he showed how the great submergence set in with this drift, increasing much southwards, but still more westward towards Wales. The effect of