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 nebulæ, 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 isotropous 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 Quettah, 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 novæ-zealandiæ*), 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 intq 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

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this was to submerge the area of Red Crag converted into land during Stage I., so that the Contorted Drift lies upon it fifty feet thick, and to cause the retreat of the ice which had given rise to the Till to the slopes of the Chalk Wold; whence masses of reconstructed chalk were brought by bergs that broke off from it and were imbedded by their grounding in this drift, contorting it (and in those parts only) by the process. He then traced, in the form of gravels at great elevations, the evidences of this submergence southwards and westwards, showing it to have increased greatly in both directions, but mostly in the western; and he connects these gravels with the Contorted Drift by the additional evidence of one of these marl masses, in which he found a pit excavated near the foot of Danbury Hill, in the London-clay country of South Essex, and which hill is covered from base to top by this gravel. The gravel which thus covers Danbury Hill, of which the summit has an elevation of 367 feet, rises in North Kent to upwards of 500 feet; to between 400 and 500 feet on the Neocomian within the Weald; to 600 feet in North Hants (where it overlooks the Weald), and also in Wilts, Berks, and the adjoining parts of Bucks; to 420 feet in South Hants; to 540 feet in Oxfordshire; to 400 feet in Cornwall; to upwards of 700 (and perhaps 1,000 and more) in the Cotteswolds; to 1,200 feet in Lancashire, and to 1,340 feet in North Wales. Eastwards, through Kent towards France, their elevation falls, and in the North of France appears to be about 130 feet; from whence the evidences of the submergence are furnished northwards by the Campinian sands and the diluvium of North Germany and Holland. In Stage III. the author traced the rise from this depression, the increase of the ice from the greater snow interception, caused by it on the Penine chain, and the consequent advance of the glacier- or land-ice. This advance gave rise to the chalky Clay, which was the morainic mud-bank which preceded this glacier, and was pushed by it as it advanced and the land rose, partly into the shallow sea (where it covered and protected for a time the gravel which was synchronously forming there), and partly on to the land; and by the aid of maps he showed the islands that were overwhelmed by it. He then showed, by a line on a map, the limit up to which this ice, as it thickened, cut through and destroyed this first deposited moraine and the gravel which it had covered, as well as such beds of Stage II. as were formed there, all this material being pushed on to add to later deposited moraine. Outside this line the gravel for the most part remains undestroyed, its contents, particularly in the uppermost layers, showing that it was fed by the approaching moraine. By the level at which the junction of this gravel with the moraine clay occurs he traces the position of the sea-line at this time (towards the end of the formation), and finds it to rise along the south-eastern edge of the clay, from 40 feet in North-East Suffolk to 160 feet in South Essex, and from that along the south-western edge to upwards of 350 feet in North Warwickshire and the parts of Northamptonshire adjoining, all this agreeing with the original increment of submergence in Stage II. He then showed, from evidence afforded by the Yare and Gipping valleys, that this ice, ceasing to advance in East Anglia, shrank into the valleys of that district, exposing the moraine it had previously laid down to the growth of vegetation, and issued only through these valleys to the sea. The Hoxne palæolithic brickearth he regards as the deposit of a lagoon produced from the interception of the drainage of this surface by the glacier-tongue thus passing through the Waveney valley. The Brandon palæolithic brickearth he regards as connected with the same state of things. In Stage IV. he described the plateau and cannon-shot gravels of Norfolk as resulting from the washing-out of the morainic clay by the melting of this ice, which, though shrunken into the valleys of the East of Norfolk, still lay high and in mass in West Norfolk; and showed that, by having regard to the different inclination of the land thus traced, the position of this gravel is reconcilable in no other way. The cannon-shot part of it he attributed to the torrents pouring from this high-lying ice over the west side of the Wensum valley; and the plateau gravels to the deposition of other parts of the same spoil carried into East Norfolk at the commencement of the process and while the ice had not thawed out of the valleys, this gravel afterwards, as the valley-ice thawed, being deposited in them. He also traced the excavation of the trough occupied by the Bain and Steeping rivers in Lincolnshire to the same cause. The finer or sandy part of this material has an extensive spread in South-West Norfolk, forming thick beds; and in a thinner form spreads over North-West Suffolk, where it wraps the denuded edges of the Hoxne and Brandon palæolithic brickearths. In Stage V. he traced the line of gravels that overlie the Chalky Clay where this clay entered the sea. This entry to the sea over the Severn drainage system took place by way of the watershed between the Welland and Avon, and by the valley of the latter. Its entry into the sea over the Thames system was by way of the watershed between this system and that of the great Ouse in South Bucks, as well as by the valley of the Colne, Lea, and Roding, and over the lower part of the watershed in South-East Essex. Its entry into the North Sea was by the valleys of the Blackwater, Gipping, and other Essex and Suffolk valleys, the entry by the Yare and Waveney being far out beyond the present coast-line. He also traced, by similar evidence, the extent to which the sea entered the Trent system after the ice vacated it. This line of gravel (after allowing for the case that the level of the junction of the gravel beneath the clay represents that of the sea-bottom, while that over the clay more nearly represents that of the sea-top), he showed to correspond with that of the junction of the gravel beneath the clay so far as this is not destroyed in the parts where the ice did not shrink into the valleys; and it also agrees with this line, supplemented by the amount of rise in the interval where the ice did so shrink. Along the south-western edge of the clay this line of gravel, subsequent to the clay, falls from near 400 feet in Bucks to 150 feet in South Essex; from whence northwards along the south-eastern edge, it falls uniformly to Ordnance datum in central East Suffolk, and probably continued to fall to 100 feet or so below this at the extreme point where the ice from the Yare valley entered the North Sea far beyond the present coast. Along the north-western edge of the formation this line falls northwards in a corresponding way to that on the south-eastern edge, save that, starting there from near 350 feet, it does not fall below, if even quite down to Ordnance datum near the Wash. He then traced the extent to which the sea on the west, deepening in that direction in accordance with the original depression of Stage II., entered the valleys of the area covered by the ice of the Chalky Clay as this vacated it; the carrying out through the Welland and Avon valleys of the red and white chalk spoil of the Bain-Steeping trough, and its deposition in the Cotteswold gravel up to a high level, coming from the Avon system over the Gloucestershire water-parting into the valley of the Evenlode, a part of the Thames system. All river-gravels north of the point where the line of gravel over the clay sinks below Ordnance datum, he regards as concealed below the alluvium, and at depths proportional to the fall of that line. Examining in detail the grounds for the contrary opinion heretofore held by himself and by geologists in general, that the great submergence succeeded the principal glaciation of England, he rejected that opinion; and no longer regarding the basement clay of Holderness (with its ancient molluscan facies) as identical with the Chalky Clay, but as moraine synchronous with the Till of Cromer, he considered the gravels with shells at extreme elevations in Lancashire to have preceded all glacial clays but these, and to have escaped destruction by the advance of the ice during the rise only at the south end of the western slope of the Penine chain, those on the eastern having been wholly swept away; but that gravels were deposited on the east side of the Penine after the dissolution of the Chalky-clay ice up to the reduced height of the sea-level at that time, and so far as the ice of the purple clay allowed the sea to come. He then relinquished the opinion formerly held by him that the passage of the Shap blocks was due to floating ice, and referred this to the land-ice crossing the Penine chain consequent upon greater snow interception from the progress of the rise; and to the same cause he referred the drift which rises high on the eastern slope of the Penine ridge north of the Aire. To this crossing of the ice having diverted first a part and then the whole of the ice-supply of the Chalk-clay glacier he attributed first the shrinking of that glacier into the valleys in East Anglia, and afterwards its dissolution by the agencies always rife in the Greenland ice (but which are there balanced by continual reinforcement), when by this diversion its reinforcement by ice from the Penine chain ceased. The purple clay of Holderness, being thus in its lowest part in Holderness coeval with the valley-formed portion of the Chalky Clay of Norfolk and Suffolk (or "third Boulder-clay" of Harmer), was the moraine of this invading ice, which, after crossing at Stainmoor, divided against the eastern moorlands of Yorkshire; and one branch going north of these moorlands through the valley of the Tees, sent off an arm down their eastern flank, the moraine from which is the narrow belt of purple clay which skirts the Yorkshire coast north of Holderness,

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and spreads out wider in Holderness. This arm, in consequence of the Chalky clay ice not having (from the westerly increment of depression), descended the eastern slope of the Wolds, found sea there covering the basement clay of Holderness, in which sea it stopped between the Humber and the Wash, by means of which the lower part of the purple clay up to the level of about 150 feet, contains intercalated in it beds of sand and gravel, and contains shells and shell-fragments, as does the Lancashire clay similarly extruded beneath the sea. The other branch came south along the western flank of the east moorlands and through the Vale of York, where it ended, and became stationary in the sea as this entered the Trent system on the final dissolution of the chalky-clay glacier. The author discovers no trace of anything like the intercalation of warm periods up to the stage with which he concludes this part of his memoir; and leaves the description of the later beds, as well as an examination how far arboreal vegetation and the coexistence of Pachyderms and Proboscideans can be reconciled with the contiguity of extensive land-ice for the concluding part of it.

Mineralogical Society of Great Britain and Ireland, April 5.—Dr. M. F. Heddle, F.R.S.E., president, in the chair.—Prof. F. J. Wick, of Helingfors, and Mr. Richard Pearce, of Denver City, Colorado, were elected as ordinary members.—Prof. A. Geikie, F.R.S., read a paper on the microscopic structure of some Scottish nitreous basalts. The paper was illustrated by a fine series of drawings and by a number of microscopic sections.—Mr. J. B. Hannay, F.R.S.E., gave an account of his recent experiments in the production of the diamond and other precious stones, and exhibited some fragments of artificial diamonds.—Dr. Heddle announced the occurrence of xonaltite, turgete, martite, and other minerals in Scotland, now discovered for the first time in that country.

Victoria (Philosophical) Institute, April 5.—A paper on life and its physical basis was read by Prof. Nicholson, M.D., F.R.S.E. The paper treated of the physical and chemical properties of the protoplasm, of the phenomena exhibited by simple masses of protoplasm in a living condition (such as the monera, the amœba, and the yeast plant), of the distinction between dead protoplasm and living protoplasm, of the nature of "Vitality," and of the nature of the temporary connection which subsists between protoplasm and life. A communication from Prof. G. G. Stokes, F.R.S., of Cambridge, having been read, several present took part in considering the subject.

PARIS

Academy of Sciences, April 5.—M. Edm. Becquerel in the chair.—The following papers were read:—On some applications of elliptic functions (continued), by M. Hermite.—Application of the theory of sines of superior numbers, &c. (continued), by M. Villarceau.—On some theorems of kinematics, by M. Resal.—On determination of high temperatures, by MM. Deville and Troost. This describes the application of their method to determining the boiling temperatures of cadmium and zinc. With air as the thermometric substance, the results closely agreed with M. Edm. Becquerel's. It is noted that the boiling points for zinc increased in using successively hydrogen, air, and carbonic acid.—On the heat of formation of oxides of nitrogen, by M. Berthelot. This paper relates to the bioxide and the protoxide. He measured the heat of formation of the former by detonating cyanogen (or ethylene) mixed with the bioxide in theoretic proportions, and from the heat of combustion in that case deducting that in the case of the same gas (cyanogen or ethylene) being burnt with pure oxygen. The heat of formation of protoxide of nitrogen was got by burning carbonic oxide with this gas and with free oxygen, and deducting. The numbers arrived at were, for the bioxide - 21·6, protoxide - 10·3. Tables of the thermal formation of oxides of nitrogen, nitrates, and ammoniacal salts, are added.—On the cyclone of January 24 last in New Caledonia, by M. Faye. The wind-movement is not spiraloid or convergent, but purely rotatory or circular. M. Faye remarks on the geometric exactness with which the winds acted, and the importance of good knowledge of the laws of storms as illustrated by the success with which Capt. Reveillere managed the frigate *Dives* in this cyclone.—On the points of the Siberian Arctic Ocean which present most obstacles to navigation, by M. Nordenskjöld. The general opinion that Cape Tcheliouskine presents most difficulty is mistaken; for numerous rivers there cause a current which frees the ice. Most difficulty occurs near the east coast of Novaya Zemblya and in the strait south of Wrangel's-land.—On the manner of presenting the theory of potential in the hypothesis generally admitted of the discontinuity of matter, by M. Boussinesq.—Winter of 1879–80 at Clermont and Puy-de-Dôme, by M. Alluard. In those parts, whenever a zone of high pressures covers Europe, and especially France, there is interversion of the temperature with the altitude (more manifest at night); it is less cold at Puy-de-Dôme than at Clermont, some 1,100 m. lower. M. Faye remarked that this contradicted the notion that areas of high pressure are due to so-called *anticyclones* (with imagined descending motion).—Meteorological observatory of Puy-de-Dôme; glazed frost of November 21, 1879, by M. Alluard.—Continuous gyratory movements produced by a rotative induction machine, by MM. de Fonvielle and Lontin. A star or other shaped piece of soft iron is put on a pivot within the frame of a galvanometric coil, through which coil is sent the current of an induction-coil in which the inductive force of the direct and the inverse current are as equal as possible. A horseshoe magnet supported above in a vertical plane by a rod may accelerate or stop the rotatory motion of the star according as its polar line is parallel or at right angles to the galvanometric wire.—Metamorphosis of the puceron of the ligneous galls of the black poplar, *Pemphigus bursarius*, by M. Lichtenstein.—Studies on chronometry; compensation, by M. Rozé.—On the algebraic equations whose first member satisfies a linear differential equation of the second order, by M. Laguerre.—On the measurer of energy, by M. Deprez.—On the specific heat and the conductivity of bodies, by M. Morisot. This describes the method (theoretical and experimental) of a new research.—On sulphides and selenides of chromium, by M. Moissan.—Thermochemical study of earthy sulphides, by M. Sabatier. Sulphide of magnesium (MgS) = + 36·8 cal.; of aluminium (Al_2S_3) = + 62·2 cal.; of silicium (SiS_2) = + 20·2 cal.—On crystallised oxalic acid, by M. Villiers.—On the amidised acids of α-oxycaproic acid, by M. Duvillier.—Relation between the sugar and the mineral and azotised matters in normal beets and beets grown to seed, by M. Pellet. It appears, *inter alia*, that the order of utility of substances in manures for beet is (1) phosphoric acid, (2) magnesia, (3) lime; then potash and soda, and lastly, nitrogen. In the two classes of beets referred to the difference exists chiefly in the leaves and stems.—On some alterations of subrenal capsules, by M. Bochefontaine.—On the simultaneous reproduction of orthose and quartz, by M. Hautefeuille. This he accomplishes by using phosphates concurrently with fluorides, producing the minerals associated as in their natural beds.—On an earthquake experienced at Poitiers and in the environs on March 22, 1880, by M. de Touchimbert.

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