plants on plants, animals on animals, and one on the other; the fertilisation of plants by insects, and the attractability of different colours for different insects. Other points recommended for study were the following:—The manner in which the habits of animals have been acquired; the manner in which varieties or species have been formed; the limit of the successive generation of insects through none but females; the diseases of plants due to parasitic fungi and insects.

THE first number of Petermann's *Mittheilungen* contains a brief account of the eruption of a new volcano in Chili, which occurred during part of last June and July. The volcano, known by the name of Lhagnell, is situated in the south of the country, in Arauco, between the volcanoes Villarico and Llaima, near the river Cautin. Immense quantities of sand seem to have been thrown out, some of which, according to Dr. Philippi, of Santiago, reached a distance of 300 or 400 miles north from the volcano. This sand is described as consisting of angular, transparent green particles of volcanic glass. Dr. Philippi also reports that for fourteen days, about midday, a strong south wind blew, as far north as Santiago, small quantities of sand, much coarser than the above, with rounded corners, opaque and grey. Great quantities of lava, according to the report of a spectator, have overflowed the district, causing considerable destruction to life, and stopping up the river Quepe, which is thus being converted into a considerable lake.

WE have received a small pamphlet, by Mr. B. H. Babbage, containing a description of a portion of the late Mr. C. Babbage's calculating machine or difference engine, put together in 1833, and now being exhibited in the educational division of the South Kensington Museum.

La Revue Scientifique for February 15, gives a summary of the much needed administrative reforms which have been introduced into the Collége de France.

WE have received the following papers recently read before the Eastbourne Natural History Society:—"On *Geoglossum difforme* or Earth-tongue," by Mr. C. J. Muller; "A Note on the Wall Pelletory," by Mr. F. C. S. Roper; "On the Planet Venus," by Mr. T. Ryle.

THE principal articles in the *Quarterly Journal of Science* are:—"On the Probability of Error in Experimental Research," by Mr. Crookes; "Condition of the Moon's surface," by Mr. R. A. Proctor, with photograph; "Colours and their Relations," by Mr. Mungo Ponton; and "Remarks on the Present State of the Devonian Question," by Mr. H. B. Woodward.

THE *Annual of the Royal School of Naval Architecture*, &c., contains some good technical papers. This publication will become vastly increased in importance, and we hope in value, by the establishment of the new school at Greenwich.

WE take the following from the *Engineer*:—The question as to whether a gasometer will explode when fired was settled in Manchester on Tuesday, February 11, when one of the gasometers at the Manchester Corporation Gasworks in Rochdale-road was destroyed by fire. The origin of the fire is not known, but about 2 o'clock a workman saw flames issuing from one end of the gasometers, and the flames could not be checked till the whole contents of the gasometer, about 600,000 cubic feet of gas, had been consumed. Many inhabitants of the neighbourhood hurried away with loads of their furniture, fearing an explosion, but nothing of the kind occurred.

ADVICES from Cyprus state that no rain had fallen on the island for months; but this is probably an exaggeration.

WE learn from the *Athenæum* that the Rev. Thomas Hincks, F.R.S., is now engaged in preparing a "History of the British Polyzoa."

PROFESSOR RAMSAY ON LAKES

PROF. RAMSAY, F.R.S., delivered a course of six lectures to working men, on Monday evenings, commencing Jan. 5, 1873, in the Lecture Theatre of the Geological Museum. The subject of the course was "Lakes, fresh and salt: their origin, and distribution in geographical space and in geological time," and the following is an abstract of them:—

I. FRESHWATER LAKES, THEIR ORIGIN AND GEOGRAPHICAL DISTRIBUTION

There are many classes of lakes in the world, formed in various ways, and though he had been unjustly charged with ascribing all lakes to one origin, he would be the last person to do so. He then went on to examine the various means which might be supposed to produce lake basins, and especially that class of lakes scattered over the whole northern hemisphere—in Wales, Cumberland, Scotland, Sweden and Norway, Russia, and N. America—the basins of which had evidently been formed by the erosion and grinding out of portions of the earth's crust. In many cases these lakes are in true rock basins, surrounded by lips of rock. How were these hollows produced by Nature? The dislocations of the earth's crust could not produce them; as a rule the sides of faults are close together or the fissure is filled up with other matter, and the depressions due to synclinal curves were never so simple or perfect as these lake basins, owing to violent disturbances, and to subsequent denudation. The theory of a special area of subsidence for each lake seems absurd, on considering the vast numbers of separate lakes, in N. America for example, lying in some case within a mile or two of each other. Again, a lake cannot make its own hollow; what little motion there is in the water can only affect the waste of the shores. Neither can a river scoop out a lake hollow, it can only produce a long narrow channel, and go on widening and deepening that, and the sediment which it carries down into the lake will in the long run fill up the lake basin. The action of the sea, too, on its shores cannot scoop out a lake hollow, it can merely wear back its cliffs and form a "plain of marine denudation" just below the level of its waters. And thus having exhausted all the other natural agencies which effect the denudation of the land, what agency remains to us to account for the formations of these lake basins, but the grinding power of ice? The lecturer then adverted to the phenomena of the formation and progress of glaciers, illustrating his remarks by diagrams of the great Rhone glacier. In the Alpine valleys there are numerous indications—in the mammellated surface of the rocks, the striation, moraines, and boulders—that at some period in the past all these glaciers had been very much more extensive than at present, and were found in many parts where now they are altogether wanting. In Greenland the whole country is covered by a universal ice sheet, which extends into the sea in some cases several miles, and where cliffs of ice rise out of the sea 200 to 300 ft. high, and, as recent soundings have shown, are sometimes 3,000 ft. deep. Large masses of these breaking off float away as icebergs, bearing with them stones and rubbish which they deposit, on melting, irregularly over the sea bottom. In the mountains of Wales and Scotland, in the Vosges, the Black Forest range, and in N. America are numerous signs of glacier action, all which prove that at one period, recent in a geological sense, glaciers were present in those districts; and boulders and boulder clay deposits show also that the Northern part of the Northern hemisphere was passing through a glacial epoch.

Boulder clay and moraines have sometimes dammed up a stream of water and formed a lake, but lakes of that kind are neither numerous nor of much importance. The theory that the true rock basins were scooped out by glaciers first occurred to the lecturer whilst observing in N. Wales, and he applied it first to the explanation of the tarns about Snowdon, but extended observation of the Italian and other great lakes, and subsequently of the American lakes, warranted him in applying it to them also. He had especially applied it to the Lake of Geneva, which lies directly in the course of the old Rhone glacier. The lake is 983 ft. in depth in its deepest part, nearly in the centre. Where the glacier entered the lake it could not have been less than 3,000 ft. thick, and as the rock underneath is comparatively of a soft character, where the ice was thickest the grinding power was greatest, and it scooped out its deepest hollow; but towards the south end the mass had grown less through melting, and the result was a shallowing of the basin. It is in the valleys of Switzerland down which the glaciers must

formerly have extended that the lakes lie. The great depth of Lake Maggiore beneath the sea-level—2,300 ft.—is no argument against the theory, for a large mass of ice would block out the sea-waters. In Wales the lakes are never of large size, Lake Bala, the largest, being about 4½ miles long; Lake Windermere lies in a true rock basin, as do many others in that district; in Scotland, where the climate was more severe, the lakes are larger and more numerous; in Sweden and Norway, in Finland and N. Russia the lakes are almost innumerable, while in N. America they are scattered almost broadcast over the country N. of lat. 43°. Where the glacial action was most intense, there the lakes become more and more numerous, and he believed they were due not to special glaciers, like those on the south side of the Alps, but to that great ice sheet which, according to Agassiz, covered the whole country. In South America and New Zealand, too, are signs of a similar action, and there too, lakes of this class occur. The present glaciers of New Zealand are very small compared with what they evidently were at a previous period, and in the course of every one of them are lakes, which, according to reports he had received, also lie in true rock basins.

II. Salt Water Lakes, their Origin and Geographical Distribution

The lecturer said that he could not account for the origin of all salt-water lakes, but for some of them the evidence is clear, and it is plain to see why they are salt. The principal minerals forming the rocks of the earth's crust are silica, alumina, lime, potash, soda, magnesia, peroxide of iron, &c. Rain-water takes up from the atmosphere and the earth's surface a small proportion of carbonic acid, and thus acquires the power of dissolving certain of these minerals as it percolates through the rocks, notably lime, which it carries away in the form of a bi-carbonate. And thus the water of all springs is charged more or less with mineral ingredients, though these may be recognisable only by the skill of the chemist. Thus the water of the fountains in Trafalgar Square contain 69·75 grains of salts per gallon, including chloride of sodium 25·7; bi-carbonate of soda 14·5; sulphate of soda 18·4. The Thames water at Teddington contains 22·5 grains per gallon, and thus carries to the sea in the course of a year 377,000 tons of salts; the old well at Bath holds 144 grains of salts per gallon, thus bringing to the surface 608 tons of salts per year. The apparently small quantity of bi-carbonate of lime in a per-centage of the salts of sea-water, is still sufficient to furnish to marine creatures materials for their shells and skeletons, and thus indirectly to build up the great beds of limestone which are now in course of formation, or belong to former geological periods. The analyses of salts in sea-water and in the water of various lakes is given in the following table:

Per centage of	Mediterranean Sea.	Black Sea.	Sea of Azof.	Caspian Sea.	Dead Sea.
Chloride of Sodium.....	2·9460	1·4020	0·9658	0·3673	12·110
,, Magnesium	0·3223	0·1304	0·0887	0·0632	7·822
,, Calcium.....	—	—	—	—	2·455
,, Potash.....	0·0505	0·0189	0·0128	0·0076	1·217
Bromide of Magnesium	—	0·0005	0·0004	trace	
Sulphate of Lime	0·1357	0·0105	0·0288	0·0490	
,, Magnesium	0·2480	0·1470	0·0764	0·1239	
Bromide of Sodium	0·0558	—	—	—	0·452
Carbonate of Lime.....	0·0113	0·0359	0·0022	0·0171	
,, Magnesia	—	0·0203	0·0129	0·0013	
Peroxide of Iron.....	0·0004	—	—	—	
	3·7700	1·7661	1·1880	0·6294	24·056

Salt lakes though not so numerous as fresh-water lakes, occur in large numbers in certain regions. The Caspian Sea with an area as large as Spain, the Sea of Aral, and a vast number among the mountains and table-lands north of the Himalaya; the Dead Sea in Syria; L. Utah, and neighbouring lakes among the mountains on the western side of North America; and among the mountains of South America and in the interior of Australia are examples of large salt water lakes. It will be noticed that all these lakes lie in an area of inland drainage, that they have rivers running into them, but that they have no outlet. On inspecting the above table it will be seen that the Black Sea is fresher than the Mediterranean, by reason of the greater supply of fresh water furnished by the rivers, and Edward Forbes showed that this freshening has caused certain of the shells of Mediterranean species to assume "monstrous" shapes. The Caspian is still fresher, and its fauna and fossils in recent deposits in the neighbourhood prove it to have once had connection with the Black Sea, from which it has been separated by changes in physical geography; it was then salter than at present, but is now growing salter again every year, and the fauna now inhabiting its waters have likewise considerable affinities with North Sea types. Its surface level is 83·5 ft. below that of the Black Sea, while the surface of the Dead Sea is 1300 ft. below that of the Mediterranean. In all cases where rivers flow into depressions in the land, however these might have been formed (oscillating movements of the earth's crust might perhaps form such large ones as the Caspian basin), carrying with them certain salts in solution, if the lake have no outflowing river, the water must be carried away by evaporation, in which case the salts will be left behind, and the remaining waters become more and more saturated. It is stated that crystals of salt have been brought up from the Dead Sea, and on the shallow waters on its coasts evaporating in summer saline incrustations are left. The same water which flows *through* the Sea of Galilee, a fresh-water lake, renders the Dead Sea one of the most remarkable salt lakes in the world. And in this and all similar cases accumulation of salts will go on till the saturation point is reached, and then precipitation will commence. The region to the north of the Himalayas is comparatively rainless, owing to the mountains condensing the moisture carried by the south winds, and the rivers consequently do not carry into the lakes sufficient water to make them overflow their boundaries, hence they are salt. Lake Baikal, with an outlet to the sea, is quite fresh. For a similar reason the moisture from the south-west winds being condensed in great part by the Sierra Nevada, the lakes which lie in the great plains and table-lands to the east of that range have not a sufficient supply of water to cause them to overflow, and consequently they are salt, and are continually becoming salter. In 100 parts by weight of the water of the Great Salt Lake in that region, there are of chloride of sodium (common salt) 20·196; sulphate of soda 1·834; chloride of magnesia 0·252; chloride of calcium a trace, making a total of 22·282. And by means of the old water levels in the form of terraces round its margin, it can be proved that it has shrunk very considerably, and therefore its salts must be becoming very much concentrated. On the surrounding plains a saline efflorescence is found, which the lecturer believed might be explained by the rain which saturated the rocks during the rainy season rising again to the surface charged with salts dissolved from the rocks, during the intense heats of summer.

(*To be continued*).

SCIENTIFIC SERIALS

THE *Zoologist* for January and February contains reviews of the works of Capt. Shelley and the late C. J. Andersson. Dr. Gray contributes a paper on the Cetacea of the British Seas, and Mr. Harting has a supplement to his paper on the British Heronries, a subject on which there are several letters also published. Messrs. Stevenson and J. H. Gurney, jun., send Ornithological notes from Norfolk, and Messrs. Gatcombe and Cordeux from Devon and Lincolnshire respectively.

THE *Entomologist* for January and February, among other articles of interest, contains one by Mr. H. C. Lord, on "The Lepidoptera of Switzerland," as far as could be obtained in a twelve days stay. Out of the sixty-three species of butterflies met with, twenty-four are not British. Many of the English commonest forms are among the most frequently found there. *Colias Hyale* is commoner in some parts than *C. Edusa*, and *C. Helice* is not unfrequently found. Mr. F. Walker continues his papers on "Economy of Chalcidiæ."

SOCIETIES AND ACADEMIES

London

Royal Society, Jan. 9.—"On a new Method of viewing the Chromosphere," by J. N. Lockyer, F.R.S., and G. M. Seabroke.

The observations made by slitless spectroscopes during the eclipse of December 11, 1871, led one of us early this year to the conclusion that the most convenient and labour-saving contrivance for the daily observation of the chromosphere would be to photograph daily the image of a ring-slit, which should be coincident with an image of the chromosphere itself.

The same idea has since occurred to the other.

We therefore beg leave to send in a joint communication to the Royal Society on the subject, showing the manner in which this kind of observation can be carried out, remarking that, although the method still requires some instrumental details, which