

Andes, the main line from Chile to Buenos Ayres, has been disturbed for about three miles by the eruption of hillocks.

An Australian paper states that a live frog had been brought to the office that had been found three or four days before incased in the solid rock, in the drive of the Sultan mine, Barry's Reef, at a depth of 400ft. below the surface. The little animal looked bright-eyed and very lively, and was apparently none the worse for its long term of solitary imprisonment.

SCIENCE IN AMERICA *

THE forthcoming number of the *American Journal of Science* will contain an extremely interesting announcement in regard to American palæontology, namely, the discovery by Prof. Marsh in the Cretaceous beds of the Rocky Mountain region, of a huge pterodactyl, or flying lizard. This form has long been known as characteristic of the deposits of Europe, and has always attracted much attention from its combination of the characters of the bird and reptile; but until this announcement by Prof. Marsh the family was not supposed to be represented in the New World. The addition therefore of the pterodactyl, to the list of American genera, shows a marked increase in palæontological affluence, and gives additional point to the statements made some time ago, that America, instead of being greatly inferior to the Old World in the variety of its vertebrate fossil remains, now bids fair to greatly exceed it in this respect. The name assigned to this new species is "Pterodactylus Oweni" (in honour of Prof. Richard Owen of London), and it is believed to have had an expanse between the tips of the wings of at least twenty feet.—We regret to learn that during the recent revolution on the Isthmus of Tehuantepec a large number of valuable collections in natural history, made for the Smithsonian Institution by its correspondent in that region, Prof. Sumichrast, were entirely destroyed in the course of the conflicts of the opposing parties.—The annual report of the Smithsonian Institution for 1869 has, after an unusual delay, just made its appearance from the public printing-office, and contains the customary variety of interesting matter, which has made this report so much sought after by persons of scientific tastes in the United States. Preceded by the secretary's usual report of the operations of the Institution for the year, it contains in an appendix numerous articles, partly original, and partly translations from such foreign journals as are not readily accessible to the American student. Among these may be mentioned biographies of Thomas Young, Augustus Bravais, Von Martius, and Marianni; an important original paper by Dr. Sterry Hunt on the chemistry of the earth; and one by Marey on the phenomena of flight in the animal kingdom; an extended paper by General Simpson, upon the march of Coronado in search of the seven cities of Cibola; one by Sir John Lubbock, on the social and religious condition of the lower races of man, &c. The report is in no way inferior in interest to its predecessors.—Salt Lake City has lately been the scene of considerable activity, in connection with the arrival there of several government exploring parties, for the purpose of fitting out for their summer's campaign. Among these may be mentioned Mr. Clarence King, who continues his geological and topographical exploration of the fortieth parallel eastward through Colorado; Major Powell, who renews his examination of the canons of Green River and the Colorado, and who is detained at Salt Lake City in consequence of the late melting of the mountain snows, the low stage of water preventing him from passing through the canons; and a portion of Prof. Hayden's party is also at the same place collecting animals and supplies for a visit to the Yellow Stone region.—By advices from South America we learn that on the 25th of April last Chili was visited by two of the severest earthquakes that have been experienced in the country since 1851. The first shock in Valparaiso was not preceded by any warning sound, and its suddenness and intensity created considerable alarm, the streets of the city being filled in a short time by people who rushed out from their dwellings in a state of indescribable confusion.—Many of our readers are familiar with the names of Mr. Thomas Say, of Philadelphia, and Mr. C. A. Lesueur, as having been among the most prominent of our naturalists during the early part of the present century, and as having added many new species to the lists. The labours of Mr. Say were directed largely toward the invertebrata, embracing more particularly the insects, shells, and crustaceans. Many of

his explorations were in the vicinity of Beesley's Point, New Jersey, where species were obtained by him that have ever since remained almost unknown to science. Several examinations have been more recently made on the New Jersey coast, for the express purpose of recovering these forms; and one of the most successful was prosecuted last spring, under the direction of Prof. Verrill, of Yale College, who, with several companions, spent a week at Somers Point and Beesley's Point. The results of their labours were much greater than they had anticipated, as they not only obtained a large proportion of all the missing forms, but secured quite a number of new species, and detected the occurrence, for the first time, of others previously known as belonging much farther south, among them two echinoderms, of which Cape Hatteras was the limit previously ascertained. Their "catch" for the week summed up about 175 species of marine animals—about 25 of fishes, 50 of crustaceans, 25 of worms, 50 of mollusks, and 15 of radiates and sponges.

MR. BENTHAM'S ANNIVERSARY ADDRESS TO THE LINNEAN SOCIETY

(Continued from page 152)

GERMANY, or rather Central Europe from the Rhine to the Carpathians and from the Baltic to the Alps, is, as to the greater part of it, a continuation of that generally uniform but gradually changing biological region which covers the Russian empire. It is not yet affected by those peculiar western races which either stop short of the Rhine and Rhone or only here and there cross these rivers with a few stragglers; the mountains, however, on its southern border show a biological type different from either of those which limit the Russian portion, indicating in many respects, as I observed in 1869, a closer connection with the Scandinavian and high northern than with the Pyrenean to the west or the Caucasian to the east. The verifying and following up these indications gives a special interest to the study of German races, their variations and affinities. In so far as formal specific distinctions are concerned, all plants and animals, with the exception of a few of those whose minute size enables them long to escape observation, may now be considered as well known in Germany as in France and England; and in Germany especially the investigation of anatomical and physiological characters has of late years contributed much to a more correct appreciation of those distinctions and of the natural relations of organic races. But much remains still for the systematic biologist, and especially the zoologist, to accomplish. Among the very numerous floras of the country, both general and local, there are several which have been worked out with due reference to the vegetation of the immediately surrounding regions, but corresponding complete faunas do not appear to exist. A few in some branches have been commenced; but in these, as in the numerous papers on more or less extended local zoology, as far as I can perceive, animals, and especially insects, seem to be considered only in respect of the forms they assume within the region treated of, frequently with a very close critical study of variations or races of the lowest grades, but neglecting all comparison with the forms a species may assume or be represented by in adjoining or distant countries.

Germany holds a first rank amongst civilised nations in respect of her biological works in most departments; they probably exceed in bulk those of any other country. Her publishing scientific academies and other associations, her zoological museums and gardens, her botanical herbaria and university gardens, her zoologists and botanists of world-wide reputation, are far too numerous to be here particularised. She excels all other nations in the patient and persevering elaboration of minute details, although she must yield to the French in respect of clearness and conciseness of methodical exposition. Her speculative tendencies are well known, and the great impulse given to them since the spread of "Darwinism" appears to have thrown systematic biology still further into the background; the sad events of the last twelvemonth have also temporarily suspended or greatly interfered with the peaceful course of science. Thus the zoological works contained in the lists I have received are almost all dated in 1868 or 1869, and have been already analysed in the reports of Wiegmann's "Archiv" and in the 5th and 6th volumes of the "Zoological Record," and the principal ones relating to exotic zoology will have to be referred to further on. In Systematic Botany also but little of importance has been published within the last ten years beyond the great "Flora Brasiliensis," which, since the death of Dr. v. Martius, has been

* Communicated by the Scientific Editor of *Harper's Weekly*.

actively proceeded with under the direction of Dr. Eichler, and to which I shall recur under the head of South America. Rohrbach has published a carefully worked-out conspectus of the difficult genus *Silene*, and, in the "Linnæa," a synopsis of Lychnidæ; and Böckeler, also in the "Linnæa," is describing the Cyperaceæ of the herbarium of Berlin, a work very unsatisfactory, considering the detail in which it is carried out, as it takes no notice whatever of the numerous published species not there represented, nor of any stations or other information relating to those described other than that what are supplied by that herbarium. It is not a monograph, but a collection of detached materials for a monograph.

Switzerland comprises the loftiest and most extensive mountain-range of which the biology has been well investigated—the Alps, which have lent their name to characterise the vegetation and other physical features of mountains generally, when attaining or approaching to the limits of eternal snows. The relations of this Alpine vegetation, both in its general character due to climatological and other physical causes, and in its geographical connection with other floras, has been frequently the subject of valuable essays, several of which I have mentioned on former occasions; and it is most desirable that the results obtained should be verified by or contrasted with those which might be derived from zoological data, and more particularly by the observation of insects and terrestrial mollusca. As a first step it is necessary that the plants and animals of the country should be accurately defined and classed in harmony with those of adjoining regions. This has been done for plants. The Swiss Flora has been well worked up both by German and by French botanists; it is included in Koch's Synopsis and some other German Floras. De Candolle and other writers on the French Flora had to introduce a large portion of the Swiss vegetation, and the compilers of the rather numerous Swiss Floras and handbooks* have generally followed either the one or the other, so that there remains but little difficulty in the identification of Swiss botanical races; but here, as elsewhere, methodical faunas of the country are much in arrear. I have the following notes from M. Humbert of what has been published in this respect during the last three years.

V. Fatio, "Faune des Vertébrés de la Suisse," 8vo, vol. i. Mammifères, 1869 (reported on in "Zoological Record," vi. p. 4); the second volume, Reptiles, Batrachia, and Fishes, to appear in the course of the present year, the 3rd and 4th vols. (Birds) to follow. This fauna is the first which has been published on the Vertebrata of Switzerland. Hitherto there have only been partial and incomplete catalogues. The species are carefully described, and there are numerous notes on their distribution and habits, from the author's observations made in all the Swiss collections and in the field. There are also interesting historical details upon certain animals which have more or less completely disappeared from Swiss territory, such as the stag, the roebuck, and the wild boar, as also on the mammifers, whose remains have been found in recent deposits. G. Stierlin and V. de Gautard, "Fauna Coleopterorum Helvetica," in the Nouveaux Mémoires of the Helvetic Society, xxiii. and xxiv., a catalogue with stations and often limits in altitude, supplementing Heer's "Fauna Coleopterorum Helvetica." H. Frey's catalogues of and notes on Swiss Microlepidoptera, in the "Mittheilungen" of the Swiss Entomological Society. P. E. Müller, Note on the Cladocera of the great lakes of Switzerland, from the "Archives" of the Bibliothèque Universelle, xxxvii., April, 1870. In his excellent memoir on the Monoclea of the neighbourhood of Geneva, Jurine had only described the small crustacea of ponds and swamps. He had not investigated the species which inhabit the Lake of Geneva, and he had also neglected some very interesting forms which are only to be met with in large expanses of water, such as *Bythotrephes ionginanus* and

Leptodora hyalina. M. Müller points out the differences there are between the Cladocera of the centre of the lakes and those of the margins. The former, which float freely over the lake, have a peculiar stamp, marking also the marine crustacea of open sea; their bodies have an extreme transparency, and they show a great tendency to the development of long and rigid balancing organs. The latter, on the contrary, are little transparent, have stunted forms, and are without balancing or other elongations which might interfere with their movements amidst solid objects, such as stones and aquatic plants near the shores; most of these littoral species show, moreover, a development of some organ that assists them in moving upon solid bodies. M. Müller finds also a very great connection between the Cladoceral faunas of Switzerland and Scandinavia.

The Association zoologique du Léman, founded upon the model of the Ray Society, has for its object the publication of monographs relating to the basin of the Léman or Lake of Geneva, that is, the region comprised between Martigny and the Perte du Rhone, with the valleys of the affluents received by the Rhone in this portion of its course. It has been carried on as successfully as could have been expected from a scientific undertaking of this nature, reckoning at the present moment nearly 200 members. It has already published papers by A. Brot on the shells of the family of Naiadæ, with nine plates; by F. Chevrier on the Nysææ (Hymenoptera); by V. Fatio on the Arvicolæ, with six plates; by H. Fournier on the Dascillidæ (Coleoptera), with four plates; and is now issuing a more important work, the result of long and patient investigation, G. Lunel's "Histoire Naturelle des Poissons du Bassin du Léman," in folio, with twenty plates beautifully executed in chromolithography. Two parts, with eight plates, have already appeared, and the work is in rapid progress. A specimen of the plates, received from M. Humbert, lies on the tables of our library. I have also a rather long list of papers on the zoology of the same district or of the Canton de Vaud, inserted in the Bulletin of the Société Vaudoise of Natural History, and of others on the zoology of other districts, from various other Swiss Transactions, all of which are noticed in our "Zoological Record," vols. v. and vi. To these must be added J. Saratz's "Birds of the Upper Engadin," from the 2nd volume of the Bulletin of the Swiss Ornithological Society, 1870. The valley of the Upper Engadin commences at 1,860 metres above the level of the sea, and ends at 1,650 metres, where commences the Lower Engadin. The list therefore given by M. Saratz includes no point situate below that elevation. He classes the birds of this valley and of the mountains which enclose it into—1, sedentary birds; 2, birds which breed in the Upper Engadin, but do not spend the winter there; and 3, birds purely of passage. He enumerates 144 species, and gives upon every one notes of its station, times of passage, abundance or rarity, &c.

Meyer-Dür has a short note in the "Mittheilungen" of the Swiss Entomological Society (iii. 1870) on certain relations observed between the insect faunas of Central Europe and Buenos Ayres—a question worthy perhaps of some consideration in connection with the above-mentioned coincidence of a Chilean and East-Mediterranean *Geum* and a very few other curious instances of identical or closely representative species of plants in the hot dry districts of the East Mediterranean, the central Australian, and the extratropical South American regions.

Swiss naturalists continue their activity in various branches of biology. E. Claparède's very valuable memoirs on Annelida Chætopoda and on Acarina have been fully reported on in the "Zoological Record," as well as Henri de Saussure's entomological papers, which have been continued in the more recently published volumes of the Memoirs of the Société de Physique of Geneva and of the Swiss Entomological Society. In Botany, since I last noticed De Candolle's "Prodromus," the sixteenth volume has been completed by the appearance of the first part, containing two important monographs—that of Urticaceæ, by Weddell, and of Piperaceæ, by Casimir De Candolle, together with some small families by A. De Candolle and J. Müller. The social disturbances of the last twelvemonth have much delayed the preparation of the seventeenth volume, which is to close this great work; but it is hoped that it will be now shortly proceeded with. Of Boissier's "Flora Orientalis," mentioned in my address of 1868, the second volume is now in the printer's hands. Dr. G. Bernoulli, who had resided some time in Central America, has published, in the

* In the list of publications of the last three years only, sent me by M. A. De Candolle, are the following new Swiss Botanical Handbooks:—J. C. Duce mmun, "Taschenbuch für den Schweizerischen Botaniker," 1 vol. 8vo of 1024 pages, with some analytical woodcuts; few details on stations. R. T. Simler, "Botanischer Taschenbegleiter der Alpenalpen," 1 vol. 12mo, 4 plates; alpine species only. Tissère (late Canon of St. Bernard, now deceased), "Guide du Botaniste au Grand St. Bernard," 1 vol. 8vo; a catalogue with detailed localities. J. Rhiner, "Prodrom der Walstätter Gefässpflanzen," 1 vol. 8vo; a catalogue with details as to localities. Mortier, "Flora analytique de la Suisse," 1 vol. 12mo; imitated from an older German "Excursions Flora für die Schweiz," by A. Gremli. A new 3rd edition of L. Fischer's "Flora von Bern" and Fischer-Ooster's "Kubi-tennesen"; the latter work, together with some contributions to the Swiss Flora of A. Gremli, adding 98 pages to the volumes of Botanical literature we already possess, without advancing a step either in giving us a clear notion of what is a species of Bramble, or in facilitating our naming those we meet with, unless in the precise localities indicated by the several authors.

Memoirs of the General Helvetic Society (vol. xxiv.) a review of the genus *Theobroma*, after having compared his specimens in the herbaria of Kew, Berlin, and Geneva.

The biological interest of the Mediterranean Region, which includes Southern Europe, the north coast of Africa, and those lands vaguely termed the Levant, is in many respects the opposite of that of the great Russian empire. Extending from the Straits of Gibraltar to the foot of the Caucasus and Lebanon, over 40 to 45 degrees of longitude, by 10 to 12 degrees of latitude, from the southern declivities of the Pyrenees, of the Alps, the Scardus, and the Balkan, to the African shores, it shows, indeed, a certain uniformity of vegetation through the whole of this length and breadth; but it has evidently been the scene of great and frequent successive geological convulsions and disturbances, which, whilst they have wholly or partially destroyed some of the races most numerous in individuals, have at the same time so broken up the surface of the earth as to afford great facilities for the preservation or isolation of others represented by a comparatively small number of individuals. The consequence is that there is probably no portion of the northern hemisphere in the Old World, of equal extent, where the species altogether, and especially the endemic ones, are more numerous, none, I believe, which contains so many *discovered* species (those which occupy several limited areas far distant from each other), and certainly none where there are so many strictly local races, species or even genera, occupying in few or numerous individuals single stations limited sometimes to less than a mile. In all these respects the Mediterranean region far exceeds, absolutely as well as relatively, the great Russian region, which has three times its length and twice its breadth; it presents, also, perhaps almost as great a contrast to a more southern tract of uniform vegetation extending across the drier portion of Africa and Arabia as far as Scinde. This diversified endemic and local character exemplified in the plants of the Mediterranean region has, as far as I can learn, been observed also in insects.

Of the three great European peninsulas which form the principal portion of the region, the Italian is the narrowest and has the least of individual character in its biology, but it is the most central one, and, including its continental base with the declivity of the Alps, may be taken as a fair type of the region generally; it is also by far the best known. Italy was the first amongst European nations to acquire a name in the pursuit of natural science after emerging from the barbarism of the middle ages; and although she has since been more devoted to art, and has allowed several of the more northern states far to outstrip her in science, she has still, amidst all her vicissitudes, produced a fair share of eminent physiologists as well as systematic zoologists and botanists; and within the last few years the cultivation of biology appears to have received a fresh impulse. It is only to be hoped that it may not be seriously checked by local and political intrigues, which appear to have succeeded, in one instance at least, in conferring an important botanical post on the least competent of the several candidates. Amongst the various publishing academies and associations mentioned in my address of 1865, the Italian Society of Natural Sciences at Milan issues a considerable number of papers on Italian zoology; and a few others in zoology and palæontology are scattered over the publications of the Academies of Turin and Venice and of the Technical Institute of Palermo. From the lists I have received, there appear to have been recent catalogues of Sicilian and Modenese birds by Doderlein in the "Palermo Journal," of Italian Araneida and Modenese fishes by Canestrini in the "Milanese Transactions," and of Italian Diptera, commenced by Rondani in the Bulletin of the Italian Entomological Society. Malacology, so peculiarly important in the study of the physical history of the Mediterranean region, has produced numerous papers, chiefly in the Milanese Transactions, and in Gentiluomo's "Bullettino Malacologica," and "Biblioteca Malacologica" published at Pisa. I also learn that at the time of the decease of the late Prof. Paolo Savi, in the beginning of April, the manuscript of his "Ornitologia Italiana" was complete, and had just been placed in the printer's hands.

In Botany, Parlatore's elaborate "Flora Italiana" has continued to make slow progress. We have received up to the second part of the fourth volume, reaching as far upward as Euphorbiaceæ, having commenced with the lower orders. The old Journal of Botany ceased with the year 1847, as I presumed to have been the case when I mentioned it in 1865, and has since been replaced by a "Nuovo Giornale Botanico Italiano," which continues, with tolerable regularity, issuing four parts in the year,

the last received being the second of the third volume. The most valuable of the systematic papers it contains are Beccari's descriptions of some of his Bornean collections. Delpino, well known for his interesting dichogamic observations, as well as for some rather imaginative speculations, has also contributed to systematic botany a monograph of Marcegraviaceæ, but, unfortunately, without sufficient command of materials for the compilation of a useful history of that small but difficult group, and with a useless imposition of new names to forms which he thinks may have been already published, but has not the means of verifying. De Notaris, under the auspices of the municipality of Genoa, has published a synopsis of Italian Bryology, forming a separate octavo volume of considerable bulk.

Of the other two great European peninsulas I have little to say, notwithstanding their great comparative biological importance. The Western or Iberian Peninsula is the main centre of that remarkable Western flora to which I specially alluded in 1869, and which, more perhaps than any other, requires comparison with entomological and other faunas. But Spain is sadly in arrear in her pursuit of science. With great promise in the latter half of the last century, and certainly the country of many eminent naturalists, especially botanists, she has now for so long been subject to chronic pronunciamentos that she leaves the natural riches of her soil to be investigated by foreigners. Willkomm and Lange's "Prodromus Floræ Hispanicæ," which, when I last mentioned it, was in danger of remaining a fragment, has since been continued, and, it is hoped, will shortly be completed by the publication of one more part. I have no notes on any recent zoological papers beyond Steindachner's Reports on his Ichthyological tour in Spain and Portugal, and the Catalogues of the Zoological Museum of Lisbon publishing by the Lisbon Academy of Sciences. The Eastern Peninsula, Turkey, and Greece, with the exception of some slight attempts at Athens, has no endemic biological literature, and, with its present very unsatisfactory social state, affords little attraction to foreign visitors. The Levant, in respect of Botany at least, has been much more fully investigated; but there, as in Turkey, much yet remains to be done; and pending the issue of Boissier's second volume already mentioned, I know of nothing of any importance in the biology of the East Mediterranean region as having been worked out within the last two or three years. As a hiatus, however, and yet a link between the Indian and the European Floras and Faunas, it will amply repay the study to be bestowed upon it by future naturalists.

(To be continued)

ASTRONOMY

On the Great Sun-spot of June 1843 *

ONE of the largest and most remarkable spots ever seen on the sun's disc appeared in June 1843, and continued visible to the naked eye for seven or eight days. The diameter of this spot was, according to Schwabe, 74,000 miles; so that its area was many times greater than that of the earth's surface. Now, it has been observed during a number of sun-spot cycles that the larger spots are generally found at or near the epoch of the greatest numbers. The year 1843 was, however, a *minimum* epoch of the eleven-year cycle. It would seem, therefore, that the formation of this extraordinary spot was an anomaly, and that its origin ought not to be looked for in the *general cause* of the spots of Schwabe's cycle. As having a possible bearing on the question under consideration, let us refer to a phenomenon observed at the same moment, on the 1st September, 1859, by Mr. Carrington, at Redhill, and Mr. Hodgson, at Highgate. "Mr. Carrington had directed his telescope to the sun, and was engaged in observing his spots, when suddenly two intensely luminous bodies burst into view on its surface. They moved side by side through a space of about thirty-five thousand miles, first increasing in brightness, then fading away. In five minutes they had vanished. . . . It is a remarkable circumstance that the observations at Kew show that on the very day, and at the very hour and minute of this unexpected and curious phenomenon, a moderate but marked magnetic disturbance took place, and a storm, or great disturbance of the magnetic element, occurred four hours after midnight, extending to the southern hemisphere." The opinion has been expressed by more than one astronomer that this phenomenon was produced by the fall of meteoric matter upon the sun's surface. Now the fact may be worthy of

* From the "American Journal of Science and Arts," vol. i., April 1871.