

the Eocene period, some others from the Oligocene; while the most recent Miocene and Pliocene deposits contain a fauna in process of decay: the deep-sea fauna of the banks of the Aral is substituted by a shallow-water fauna, and the Nummulite banks disappear. The chief fossils are teeth of sharks, some Lamellibranchiata, and a few oysters (*Sphenia rostrata*, Lamk.; *Modiola subcarinata*, Lamk.; *M. jeremejewi*, Roman.; *Alligator darwini*, Ludw.; *Ostrea raincurti*, Desh.; *O. longirostris*, Lamk., &c.). These features, as also the extension of pudding-stones, especially on the outskirts of the Tian-Shan, are indicative of their littoral origin. The same distinction appears as to the minerals they contain. Several great beds of gypsum, brown-coal, and bituminous slates are found in the Tertiary deposits around Lake Aral, as also naphtha in the Balkhan mountains; but both naphtha and brown-coal are absent in the Tian-Shan deposits, which contain, on the contrary, salt, together with gypsum.

The Post-Pliocene Aral-Caspian deposits can hardly be delimited from the Tertiary deposits. Their maximum thickness does not exceed 100 feet. Both in the Black-Sands (Kara kum) and the Red-Sands (Kyzyl-kum) they consist of a sandy clay which often passes upwards into a clayey sandstone. As to their petrographical features, they are the same from the Volga to the foot of the Tian-Shan. The fossils they contain (*Cardium edule*, *Dreysena polymorpha*, *Neritina liturata*, *Adacna vitrea*, and *Hydrobia stagnalis* in the Kara-kum; *Lithoglyphus caspius*, *Hydrobia stagnalis*, *Anadonta ponderosa*, and the Spongia described as *Metschnikowia tuberculata* by M. Grimm in the Kyzyl-kum) are all now living in the Caspian and Lake Aral, and precisely in the littoral shallow-water zone.

What are the limits of this immense Post-Pliocene basin surely forms one of the most interesting problems of geology, and they can already be determined approximately. In the west, the Ergeni hills (which run due south of the great Tsaritoyu bend of the Volga) form its western shore¹—a great gulf extending along the broad valley of the two Manych rivers towards the Black Sea. Further south it must have been much nearer to the present shore of the Caspian, with a broad gulf to the west in what is now the valley of the Kura. How far this gulf extended towards the north remains still unsettled. The evidence derived from the *Dreysena polymorpha*, found as far north as the Samara winding of the Volga, is still contested by MM. Möller and Grimm—this species of *Dreysena* being a too cosmopolitan one; but the discovery of a few Caspian mussels even further north, towards Simbirsk, as well as the orography of this region, make one incline to the opinion that a narrow gulf of the Aral-Caspian Post-Pliocene sea extended almost as far as the mouth of the Kama, with a wide lake filling up the Oka depression of the Volga and communicating with the sea by an outlet. It is known that this basin extended towards Lake Aral and further east, with a peninsula which entered it from the north, and which is now known as the Ust-urt and Mugo-djar hills. How far it

extended towards the east remains still unsettled. M. Moushketoff only mentions the supposition of the late M. Severtsoff as to the connection which existed between Lake Aral and Lake Balkhash. However probable this connection, we ought to take into consideration the latest researches of Russian zoologists, according to which the fauna of Lake Balkhash would have much more kinship with the lakes of Central Asia than with the fauna of Lake Aral. If this fact is confirmed, we should probably distinguish two different periods—an earlier and a later one—during which last the connection between Lake Balkhash and Lake Aral was broken, but continued between the former and the eastern lakes of Central Asia.

As to the southern limits of the Aral-Caspian basin, they cannot yet be determined with certainty. Aral-Caspian deposits are wanting in the middle parts of the Kyzyl-kum plateau, so that the southern shores of this basin must have been somewhere in the latitude of the Bukan-tau mountains. Further east they ran in a more southern latitude. In the Sary-kamysh depression and for 160 miles further south we again find Aral-Caspian mussels, as far as the Bala-Ishem wells, and in this region the Uzboy (formerly considered as the old bed of the Amu) disappears. South of Lake Aral they hardly reach the latitude of Merv. From all these data, M. Moushketoff concludes that the basin consisted of two different parts—the Caspian and the Aral part—connected by a narrow outlet passing by the base of the Balkhan mountains. The eastern portion was shallower than the western; it had more islands, and its organic life was poorer. It was also subdivided, in its turn, into two parts connected by the Aibughir outlet.

As to the drying up of this basin and its subsequent modifications, which M. Moushketoff attributes in great part to the agency of the wind, we shall devote to them a second article, inasmuch as the author's observations on the dunes and moving sands deserve special attention.

P. K.

(To be continued.)

THE NATURALIST'S DIARY

The Naturalist's Diary. Arranged and Edited by Charles Roberts, F.R.C.S., L.R.C.P., &c. (Swan Sonnenschein, Le Bas, and Lowry, Paternoster Square).

THIS book may be described as a most excellent *vade mecum* and guide to any person who not only wishes to keep a phenological diary, but who wishes to know what to enter therein. The preface and introduction show forth the principles which have guided the author in making this compilation, and the important services it may be made to render to biologists and to men of science, as well as to practical gardeners, agriculturists, sportsmen, and residents in the country generally. It is also recommended to the notice of tourists, and especially to those who find themselves perchance perforce anchored in some one of our numerous health resorts, cut off from their usual avocations. Mr. Roberts's observations have been made on the breezy downs of Marlborough in connection with the Marlborough College Natural History Society, 1864-84. They include registration of mean, maximum, and minimum temperature in sun and shade, "accumulated temperature" above 42° day-degrees, barometrical observations, rainfall, and direction of wind.

¹ Prof. Barbot-de-Marny, whose deep insight and keen observation are so highly esteemed, extended these limits further west. Several considerations derived from the orography and physical geography of the region give, in my opinion, great probability to M. Moushketoff's view on the question. He has also had the opportunity of making a more thorough exploration of the region.

These are, however, only the necessary key to what follows in the most interesting observations upon the first appearance of each familiar flower, the maiden song of each sweet warbler of the grove, the arrival of summer visitants, such as the swallow, swift, corn-crake, or cuckoo, and the emergence of insect, reptile, fish, or hibernating mammal from winter's sleep.

The student is provided with a series of 365 pages, fittingly and instructively introduced, one being devoted to every day in the year. Each page is numbered both prospectively and retrospectively, showing not only the number of days or pages from the beginning, but to the end. These pages are partly blank, and upon the left-hand side the reader is told what to look for in the vegetable or animal kingdom, what flower may be expected to raise its head, or, as the season advances, what fruit may be expected to ripen. We are almost all of us keenly alive to the interest of watching the unfolding season, and a book of this kind embodying information already obtained, and inviting the reader to record his own observations on the same points, must commend itself to a large class of persons. Take as an example p. 133, or the 133rd day of the year, May 13, and we find that we should on this day "look out" for the green hair-streaked butterfly, the light tussock and rivulet moths, and the egg of the lesser whitethroat; we may also look for the spindle-tree in flower and the common mallow, although somewhat before their usual times. The blossom of the white-thorn, which is always known as "May," has been seen at Marlborough on April 30, and again has not been seen till June 4, information which is thus succinctly set forth, "*Cratægus oxyacantha*, 120-155, Hawthorn, Whitethorn, May," the figures indicating the earliest and latest days of the year upon which this favourite flower has been known to bloom.

There appears, indeed, to be no limit to the kind of things which an earnest student of Nature might not pleasantly note as affording material for his *Naturalist's Diary*. And so wide is now the net thrown, and so extraordinary are the correlations of science, that no fact need be passed over as unworthy of notice. For example, we are told in the introduction that "closely connected with the subject of migration, and equally deserving of systematic observation, is the congregation or flocking of birds in the autumn and winter months, as it is probably correlated with hibernation of fishes and reptiles." So that watching the loves of doves, and packing of partridges, listening to the early soft cooings of pigeons, or the crow of the pheasant, chronicling the advent of the cuckoo, or of "sweet Philomel complaining," or listening to the first strains of that "rapture so divine" which the immortal Shelley ascribed to our most sustained songster—in each case we may by accuracy of observation add a drop to the ocean of facts slowly developing into universal knowledge. Such a task could not fail of being attractive. Possibly it may tend to dissipate the sweet and more dreamy influences which steal over us insensibly while experiencing the gradual unfolding of Nature—the feeling so tenderly expressed by Longfellow in his exquisite prelude to the "Voices of the Night"; but this awakening from the poetic dream appears to be the fate of communities as well as of individuals, and we must, we suppose, resign ourselves to it. It is the province of science

to ransack, to dissect, to arrange, to chronicle, and not to "babble o' green fields" only, as Dame Quickly said of poor Sir John Falstaff lying a-dying.

Downton, May 12

JOHN WRIGHTSON

OUR BOOK SHELF

Scientific Results of the Second Yarkand Mission, based upon the Collections and Notes of the late Dr. F. Stoliczka. "Araneida." By the Rev. O. P. Cambridge, M.A. (Published by order of the Government of India, Calcutta, 1885.)

WE have already on several occasions noticed the memoirs published by the Government of India on the collections made during this expedition to Yarkand. The spiders were placed in the very capable hands of the Rev. O. P. Cambridge for description. The collection cannot be considered as fairly representing the fauna of the extensive region traversed during the expedition, an area which Mr. Hume thinks might be subdivided into five well-marked regions, but which the author, judging from the collection of Araneida, conceives might have been well considered as but two: that is, (1) from Murree to Cashmere, including the latter as well as the former; and (2) the whole of the rest of the area travelled over by the Expedition, and comprising the neighbourhood of Leh, the route from Tantzé to Chagra and Pankong Valley, and from Yarkand to Bursi, as well as Yarkand and neighbourhood, Kashghar, the hills west of Yarkand, and the Pamir.

In the former of these more than half of the whole number of spiders were collected—69 out of 132. The leading character of these is European, with a few more distinctly tropical and sub-tropical species. The character of the latter region is also European, but with decided sub-Alpine features, and scarcely a trace of any even sub-tropical form; and of the 69 species met with in the former three only were found in the latter, and only one, *Drassus dispulsus*, occurred throughout.

Of the 132 species, 23 seem identical with European species already described, leaving the large proportion of 109 as apparently new to science. Even this number cannot be supposed to represent the new species in the fauna of this region. The season of the year was very much against the success of the collection, and the hands of the collector were very much engaged with other branches of natural history; and there can be no doubt that a large harvest awaits the explorer of the southern slopes of the mountain regions of Cashmere, where the tropical character of the forms will become more marked; and probably a still greater diversity in the species will be found in those from the more central regions of India. For comparison upon these points the author regrets that there exist no materials, for almost nothing has as yet been published about the spiders of tropical India.

Two quarto plates with 21 figures of the more important new species accompany this Report.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]
[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.]

The Thomson Effect

I AM indebted to Dr. Everett for calling my attention to the confusion which has crept into § 193 of my book on "Heat." I had not noticed it; but, happily, it can easily be removed. Take to the end of the section the statement quoted by Dr.