SCIENTIFIC BOOKS

The Indigenous Land Mammals of Porto Rico, Living and Extinct, Memoirs of the American Museum of Natural History, N. S., II., Pt. II., October, 1918. By H. E. ANTHONY.

Captain Anthony has been very fortunate in being able to study a very interesting phase of mammalian evolution; the borderline between the extinct and the recent. This fact makes his excellent memoir extremely interesting to students of vertebrate evolution. The work was attempted as a phase of an extensive survey of Porto Rico, covering the recent fauna and flora, the authropology and archeology; Captain Anthony confining his attention to the mammals. Most of the fossil forms are of Pleistocene age, though their nature is such as to lead Dr. Matthew to suggest to the American Philosophical Society[1] that Porto Rico and its adjacent islands have not been in direct communication with the mainland since the early Pliocene. The great body of the monograph, illustrated by 55 text figures and 76 photographic plates, is devoted to the systematic descriptions of the forms, chiefly bats. A few amphibian and reptilian bones were also discovered but these have not been discussed. The reptilian bones seem to be lizards of the general type of *Amblyrhynchus,* because of the presence of epiphyses. Anthony concludes:

> Judging from the character of the ancient mammalia, it (the fauna) must have reached the present islands at approximately some time in the period from the Oligocene to the end of the Miocene. In the Miocene the fauna of South America was of very much the same general character as that of the ancient island fauna and in the light of present-day knowledge of South American paleontology the relationships of most of the island mammals undoubtedly run back to the South American Miocene formations.

The presence of two large ground sloths, *Acratocnus odontrigonus* and *A. major* which the author compares with South American *Hapalops* and *Eucholœops* is an indication of the relationship of the early South American fauna with that of Porto Rico. The osteology of these two ground sloths, so far as known, is carefully illustrated and described.

[1] SCIENCE, N. S., XLIX., 546, 1919.

ROY L. MOODIE
COLLEGE OF MEDICINE,
UNIVERSITY OF ILLINOIS,
CHICAGO

The Boys' Book of Chemistry. A Simple Explanation of Up-to-date Chemistry. Together with Many Easily Made Experiments. By CHARLES RAMSAY CLARKE. New York, E. P. Dutton & Company. 1918.

It is so obviously desirable that the youth of to-day should take a keen interest in chemical science, to which such prominence has been given in the war-time activities that one would welcome the appearance of a satisfactory book for boys' use. Unfortunately "The Boys' Book of Chemistry" is not only a disappointment, but it is one of the most pernicious little volumes that has appeared for a long time. The chemical statements are absolutely wrong in a considerable number of instances and misleading in many more, and the book is subject to severe criticism both as to its English and the arrangement of its subject matter. The degree of judgment shown in the selection of material is perhaps sufficiently indicated by the statement that in the chapter entitled Synthetic Chemistry for Beginners the first four syntheses are those of camphor, indigo, tannin and rubber; and these are given in mere outline form which is practically valueless to the reader, boy or man. At a time when books which will lead to an intelligent interest in chemistry are so desirable, it is unfortunate that this volume should appear to the confusion of its readers.

H. P. TALBOT

NOTES ON METEOROLOGY AND CLIMATOLOGY

METEOROLOGICAL ASPECTS OF TRANSATLANTIC FLIGHT

DURING the early preparations for the trans-Atlantic flight most of the discussion centered on the machines themselves, but when it became evident that airplanes and dirigibles could stay in the air long enough to accom-

plish the flight, the interest in the meteorological aspects became more manifest. And when aviators intending to fly across the Atlantic had to wait many weeks for favorable weather, the importance of the meteorological conditions became recognized as paramount.

"Trans-Atlantic flight from a meteorologist's point of view," was discussed in detail by Mr. W. R. Gregg, of the Weather Bureau, at a meeting of the Philosophical Society of Washington, March 29, 1919; and this paper was published widely during the first half of May.[1] In the selection of routes for trans-Atlantic flight, helpful winds as well as geographical distance must be considered. Thus, the best eastward routes are Newfoundland to Ireland and Newfoundland to the Azores and Portugal; while the best westward routes, so far as wind aid is concerned, are (1) Scotland to Labrador via Iceland and Greenland, (2) Portugal to the West Indies, and (3) Africa near Cape Verde, to eastern Brazil. Since eastward flight from Newfoundland offers the best initial possibilities for airplanes, Mr. Gregg confined his discussion to the weather conditions in the middle latitudes of the North Atlantic.

The temperatures in winter or summer are usually not extreme. The moisture of the air over the oceans is of importance only in its connection with fogginess, cloudiness and precipitation. The average cloudiness along the more northern route (Newfoundland to Ireland) is about 70 per cent., but this includes the thick fogs as well as the clouds. Fortunately, the aviator can generally rise above the clouds for observation, and over the sea, it is not so dangerous to fly below low clouds as it is over the land. Rainfall occurs very frequently, *i. e.,* on about two thirds of the days—but, here again, it is possible for the aviator to fly high and thus to avoid the heaviest rain. Fog, while a grave danger in trying to land, or in flying low, usually does not extend high. On the Grand Banks fogs occur on about 60 per cent. of the days in summer and 20 to 35 per cent. of those in winter; on the Irish coast the percentages are 10 and 5, respectively. Since these fogs do not usually extend very far inland, they seldom would prevent landing. The vertical extent of the Newfoundland fogs is almost always less than 250 meters, and so can easily be left below the flier at the start.

The general pressure distribution and winds favor eastward flight, though the frequency of gales is unfavorable, gales occurring on about 25 per cent. of the days in winter and 5 in summer on the Newfoundland to Ireland route, and slightly less often on the Newfoundland to the Azores and Portugal route. Tropical cyclones, fortunately, are rare. The conditions in the free air are not very different from those on the surface, for over the ocean the wind increases and turns but little with altitude, the surface friction being very small relative to that over the land.

While the average conditions are generally favorable for eastward flight in middle latitudes across the North Atlantic, the actual conditions at a particular time are those which must be encountered. The problem, then, is to choose a day on which the winds will be most favorable. Mr. Gregg chose from among the daily weather maps of the North Atlantic on file at the Weather Bureau, May 29, 1906, as a day which would have been a good one for a start. By interpolating weather maps at two-hour intervals he computed for eight divisions of a flight from Newfoundland to Ireland, the direction and velocities of the "gradient" winds, and from these the proper bearings of an airplane's course which would carry it to Ireland with the aid of the wind, in the shortest possible time. He computed not only the bearing of the course, but also the direction in which the airplane would have to move relative to the air in order to maintain the necessary bearing for the stipulated distances of each part of the course. On May 29–30, 1906, an airplane with an air-speed of 90 mi./hr. could have made the flight in 17 hours, whereas in a calm 20 hours would have been necessary.

With the aid of Messrs. Tingley and Paterson of the marine division of the Weather

[1] See *Monthly Weather Review,* 1919, Vol. 47, pp. 65–75.

Bureau, Mr. Gregg also classified the daily weather maps of the North Atlantic for a ten-year period into days when wind conditions were excellent, good, fair, or poor for the journeys both ways and both routes. Grouping the excellent and good days together, the average number of days in May favoring Newfoundland to Ireland flight is 12, Newfoundland to Portugal, 11, and return on both routes, only 2. For June, the corresponding figures are 10, 6 and 2. While on the average there should be plenty of favorable days, individual months vary greatly. Thus, in July, 1906, there were 28 favorable days for the trip to Ireland, but in July 1907, only 4.

Mr. Gregg's general conclusions are worth quoting:

CONCLUSIONS

1. In the present stage of their development and until improvements give them a much larger cruising radius than they now have, airplanes can not safely be used for trans-Atlantic flight except under favorable conditions of wind and weather.

2. Observations of conditions over as great an area as possible, and particularly along and near any proposed course, should therefore be available at as frequent intervals as possible, these observations to include free-air as well as surface conditions.

3. With such observations at hand the meteorologist is able quickly to determine the current, and probable future, wind conditions along a proposed route and to advise an aviator as to the suitability of a day for a flight.

4. If a day is favorable, the meteorologist is able to indicate the successive directions toward which an airplane should be headed in order to keep to any desired course; also, to calculate the assistance that will be furnished by the winds.

5. Inspection of marine weather maps shows that at an altitude of 500 to 1,000 meters conditions are favorable for an eastward trip approximately one third of the time, the percentage being slightly greater along the northern than along the southern route. At greater altitudes the percentage of favorable days materially increases, especially along the northern route. For the westward trip the percentage of favorable days is so small as to make trans-Atlantic flight in this direction impracticable until the cruising radius of aircraft is increased to such an extent that they are relatively independent of wind conditions.

6. All things considered, conditions for an eastward flight are most favorable along the northern course; for a westward flight they are most favorable along the southern course; that is, the prevailing westerlies are less persistent along this course than farther north.

7. There seems to be little choice as to season, for, although the prevailing westerlies are stronger in winter than in summer, yet, on the other hand, stormy conditions are more prevalent in winter, and the net result is about an equal percentage of favorable days in the two seasons. Moreover, the greater fog percentage in summer just about offsets the greater percentage of cloudiness in winter. Fog is a disadvantage chiefly because of its interference in making observations with drift indicators. The Newfoundland fogs in general are of small vertical extent and do not extend far inland. They should not, therefore, prove a hindrance to landing, if the landing field is located some distance from the coast.

8. Most important of all, there is need for a comprehensive campaign of meteorological and aerological observations over the North Atlantic in order that aviators may be given data for whose accuracy the meteorologist need not hesitate to vouch, instead of information based on so small a number of observations, particularly of free air conditions, that the deductions, including some of those in this paper, are assumed and not proved, are given with caution, and are "subject to change without notice."

How some of these conclusions have worked out in actual practise is being discussed in contributions to be published in the *Monthly Weather Review*.

CHARLES F. BROOKS

WASHINGTON, D. C.

SPECIAL ARTICLES

A CHART OF ORGANIC CHEMISTRY, AROMATIC SERIES

THE following chart was made and is used in connection with the elementary organic chemistry course given at the university. The heavy type lines in the benzene rings indicate the double bonds while the light lines indicate the single bonds. In order to emphasize certain characteristic groups, position of substituents in the rings, etc., red lettering was used. In the following miniature