IF there were any valid argument for accenting "research" on the first syllable, it would equally well apply to a great number of other words beginning with "re-," in which the force of the prefix is exactly the same (for those who advocate accenting the penult, "reinter" is a good one for practice!).

The solution of this problem (and of all others of similar character) is clearly and definitely indicated in an admirable little book by Martin C. Flaherty, entitled "How to Use the Dictionary" (Ronald Press Co. 1923). It can be read in a few hours and will richly repay the effort.

E. H. MCCLELLAND
CARNEGIE LIBRARY OF PITTSBURGH

CORRECTIONS TO THE BIOGRAPHICAL DIRECTORY OF AMERICAN MEN OF SCIENCE

IN the fourth edition stars should be attached to the subjects of research of Dr. Atherton Seidell, chemist in the hygienic laboratory of the U. S. Public Health Service, and of Dr. T. Wingate Todd, professor of anatomy in Western Reserve University. The copy was correct, but unfortunately the errors were passed by the proofreaders.

In the table (page 1128) showing the strength of institutions in the different sciences, Harvard University should be given a rating of 4.6 in anthropology, one man who was called to Harvard before the date of reference not having been so recorded. This places Harvard first among universities in anthropology and further emphasizes its dominant position. Changes in position are frequent, the situation having altered in a number of institutions between the date to which the table refers and the time of its publication.

Several less serious errors have been discovered, as also the omission of names that should be included. The latter situation, however, is inevitable, partly owing to the large number of individuals concerned and partly because some scientific men will not reply to requests for information.

J. MCKEEN CATTELL

REPORTS

WORK ACCOMPLISHED BY THE FIELD MUSEUM PALEONTOLOGICAL EXPEDITIONS TO SOUTH AMERICA

THE work undertaken by the Field Museum paleontological expeditions to Argentina and Bolivia has been finished. The party composing the second expedition returned to Chicago in November, 1927. Collections brought together by these expeditions from many localities have now been received at the museum.

These expeditions, made possible by the generous support of Captain Marshall Field, were active from 1922 to 1927. The work has been carried on by two successive expeditions under the leadership of the present writer. The object was to make collections of fossil mammals from as many as possible of the known fossil-bearing horizons of South America. A similar undertaking had not been made by a North American institution since the Princeton University expeditions to Patagonia of 1896–99.

The first expedition, consisting of E. S. Riggs, G. F. Sternberg and J. B. Abbott, set out from Chicago early in November, 1922, and proceeded to the Santa Cruzean formations of southernmost Argentina. Near the Port of Rio Gallegos the first working base was established. Collecting was carried on in the province of Santa Cruz until the end of the following May, when the approach of southern winter made a movement northward advisable. Collections amounting to 282 specimens of fossil mammals, together with a few specimens of fossil birds, were made from the Santa Cruzean formation. This number included 177 skulls, with a few skeletons more or less entire. According to field determinations, this collection included thirty-two genera of fossil mammals, and a considerably larger number of species.

With the approach of winter the party moved northward to the vicinity of Commodoro Rivadavia. There the months of July and August were passed in collecting recent mammals and birds when weather conditions permitted.

The second working season, from September to May, 1923–4, was devoted to collecting fossil mammals from the earlier fresh-water formations, designated by North American geologists as the Deseado Series, and referred by them to the Oligocene period. Collections of fossil shells to the number of three hundred, and a few specimens of cetaceans, were also made from the Patagonian Beds. Some collections of Cretaceous dinosaurs were made from the San Jorg formation. A fossil forest of *Araucaria* was discovered near Cerro Madra y Higa of the province of Santa Cruz, and a collection of 250 specimens of cones, twigs and branches made from it. Unrecorded occurrences of Deseado mammals were examined near this point and at another locality in the vicinity of Pico Truncado.

Of the Eocene mammals, only a limited collection was made from the "Nothostylops Beds" of Ameghino. A larger collection, comprising 256 specimens, was collected from the upper fossil-bearing horizons of the Deseado formation, including the "Astraponotus Beds" and the "Pyrotherium Beds" of Ameghino. No less than eight widely separated fossil-bearing localities were examined, and a reconnaissance was made through the northern part of the province of

Santa Cruz and the southern part of the province of Chubut.

In May of 1924 the party again moved northward to escape the severe weather of winter. The two collectors then returned to the museum. The leader with one assistant visited the Pliocene (Araucanian) exposures along the River Parana without discovering any promising collecting grounds. A collection of 110 Pliocene invertebrates was there made. The party then proceeded northward to Bolivia. The succeeding winter was devoted to collecting in the Pleistocene formation about Tarija. Local men were employed as collectors and work was carried on there from July to December. This resulted in a collection of 126 specimens of Pleistocene mammals of both indigenous and immigrant stocks. Among this number are three large skeletons and a number of skulls.

Returning to Buenos Aires in December the party disbanded. Plans were then laid for the work of a second expedition. Reconnaissance was made by the leader through the Pampean formations and westward along the Rio Negro as far as Neoquen. The dinosaur-bearing localities of the Roca formation were there examined. The leader of the expedition then returned to the museum to recuperate and to organize a second expedition.

The personnel of the second expedition included, under the same leader, Mr. R. C. Thorne, of Chicago, and Dr. Rudolf Stahlecker, of the University of Tübingen, as collectors. Camp men and other helpers were employed as occasion arose. The party set out from Chicago in April, 1926, proceeding to Buenos Aires and thence to the northern provinces of Argentina.

The first task of this expedition was to find a productive locality and to make collections of Pliocene mammals. The Araucanian formations of the River Parana and of the southern coast of the Province of Buenos Aires had long been exploited by Argentine collectors and did not at this time offer promise of good collections. Attention was therefore directed toward the Catamarcan formation of the northern provinces. The known locality of the Valley of Santa Maria in the Province of Catamarca was first visited. Local help was employed, pack-animals and mounts were secured, camp established and collecting begun about the twentieth of May.

The massive sandstone and indurated clays exposed in abrupt cliffs at the base of the Aconquija Mountains yielded important returns. This locality was small and soon exhausted. The Santa Maria valley was then explored northward into the provinces of Tucuman and Salta. Finding less promising fields in that direction, the base camp was moved to Puerta Corral Quemada in the Department of Belen. A new field was there developed which proved most productive. The Catamarcan formation, composed of sandstones and clays similar to that of the Valley of Santa Maria, was found to reach a thickness of more than six thousand feet. This series was exposed in mountain ridges, with included valleys, everywhere highly inclined and folded, and evidently of pre-Andean age. The fauna contained in this formation proved to be essentially the same as that of the type locality near Santa Maria. The lowermost measures of reddish sandstones yielded a scant fauna of toxodonts and glyptodonts. The middle measures yielded a typical Araucanian fauna similar to that of Entre Rios, the type-locality in the Valley of Santa Maria. The upper measures revealed a more varied, and somewhat later, fauna, which appeared to be forerunners of well-known Pleistocene animals.

Collecting was carried on along the River Corrall Quemada until the beginning of the rainy season in November. The entire collections were then gathered at Andalgala for shipment by railway and the party moved southward for the ensuing summer. The collections made from the Catamarcan formation included glyptodonts of five or more genera, gravigrade sloths of two genera, armadillos in considerable variety, two or more forms of toxodonts, four forms of typotheres, one of macrauchenids, a procyonid, one or two marsupials and a profusion of rodents of indigenous forms. There were also found some variety of large birds, a single species of great tortoise and a few small batrachians. The collection from the Catamarcan formation numbers 181 specimens of fossil vertebrates. Invertebrates were found in the lower horizon only. The entire fauna is so different from that of the Santa Cruzean beds as to indicate a prolonged interval of time between the close of the Santa Cruzean period and the beginning of the Catamarcan.

The expedition had by this time secured representative collections from the Deseado series, the Santa Cruz formation, and from the Catamarcan formation, which, following North American geologists, may be designated as of Oligocene, Early Miocene and Pliocene age, with a moderate representation of early Pliocene mammals from the Tarijan formation. Attention was now fixed upon the great indigenous mammals of the South American Pleistocene. From the discoveries made by South American paleontologists during the past seventy-five years, this fauna appears to have found its best expression in the Pampean formations of central Argentina. In this populous region the Pampean fossils had been correspondingly exploited by local and visiting collectors. The task of making collections from this formation was therefore entered upon with some doubt as to success. On the other hand, specimens of the great ground sloths and of glyptodonts were especially desired because of

their immense size and their unique characteristics, which render them of especial value as museum exhibits.

Localities along the southern coast of the Province of Buenos Aires were selected as offering the best prospect of securing good specimens of the great Pampean mammals. The motor equipment, which had been stored since the first expedition, was again brought into use. The coastwise exposures from Bahia Blanca to Miramar were gone over. Some collecting was done on the beaches as exposed at low tide, along the low sea-cliffs and among sand dunes near the shore, where small areas had been denuded by wind erosion. More favorable collecting grounds were found along the banks of certain rivers, whose channels have, in their lower courses, cut through the entire Pampean formation. These steep banks, swept clear of débris by floods in every period of high waters, offered the most favorable opportunity for discovering specimens.

From these localities a collection of sixty-two specimens was secured. Among the number is more than half of an articulated skeleton, including head, of the greatest of the ground sloths, *Megatherium americanum*. Excellent articulated skeletons of the intermediate-sized sloths, *Scelidotherium* and *Glossotherium*, good specimens of the great saber-tooth tiger and of the Argentine mastodon, and various specimens of fossil horses, llamas and rodents were also secured.

This work held the expedition in the south until the close of the southern summer. In May the party again moved northward to continue collecting in the Pleistocene valley-deposits of Bolivia. Dr. Stahlecker, who found it necessary to return to Germany at this time, was replaced by Sr. Jose Strucco. A new force of camp men and helpers also was employed.

As soon as preliminaries had been arranged, the party pushed on from Tarija into the small, isolated valley of Patcaya. There a formation of valley sediments similar to that of Tarija was found. Quarters were established for the winter and collecting was begun among the arroyos and thornbushes of this mountain district. The prize specimen here secured was an articulated skeleton, almost entire, of the mountain species of the great sloth, *Megatherium tarijensis*. Specimens of the equally large sloth, *Lestodon*, rewarded prolonged excavations in an old stream-channel. Two articulated skeletons of *Glossotherium* compensated for months of patient search through bush-lands. Various specimens of the Andean horse and of camels and llamas added to the sum total of the winter's collection.

By the end of September, 1927, collecting by the second expedition was terminated. Shipments were made during the succeeding month. The party then returned to Chicago by way of Peru and the western coast.

The results of the two expeditions may be summed up as follows: Representative collections of fossil mammals were made from the Eocene, Oligocene, Early Miocene, Pliocene and the Earlier and Later Pleistocene of Argentina and Bolivia. During this work the Field Museum parties examined most of the formations of Argentina and Bolivia which have yielded fossil mammals. Collections were made from no less than twenty-two different localities, several of which were first made known by the labors of these expeditions. Fossil invertebrates were collected from Cambrian, from Miocene and from Pliocene formations. A rare collection of fossil cones, twigs and branches of the genus *Araucaria* was made from fossil trees found *in situ* near Cerro Madre y Higa, of the province of Santa Cruz. Small collections of recent mammals, birds and reptiles were made; also collections of flowering plants from the provinces of Chubut and Catamarca. Studies of stratigraphy in the several fossil-bearing localities were carried on and a number of geological sections were prepared. A series of some twelve hundred photographs were made for the purpose of recording the work of the expedition, as well as to illustrate subjects of more general interest.

Through the courtesy of the Argentine and the Bolivian governments, all these collections, excepting a certain number of duplicated specimens, were permitted to be exported to the United States. The various shipments, totaling nearly three thousand specimens of fossil mammals, birds, reptiles, mollusks and plants, have safely arrived at the Field Museum. The preparation and the study of these collections will require a period of years. A number of specialists in various lines have been invited to assist in this task.

ELMER S. RIGGS
FIELD MUSEUM OF NATURAL HISTORY

SCIENTIFIC APPARATUS AND LABORATORY METHODS

MAKING A CORRECT MECHANICAL ANALYSIS OF SOILS IN FIFTEEN MINUTES

IN previous communications the use of the hydrometer method has been proposed as a rapid and simple method for the study of soils.[1] A very comprehensive study has been made to ascertain if the method could be used for making a mechanical analysis of soils. It has been discovered that if the soil particles are grouped into three main groups—sand, silt and clay or colloids—these three groups can be determined by

[1] *Soil Science*, No. 5, 1927; No. 4, 1927; SCIENCE, July, 1927.