bordering on, your special field. And ask yourself how many people there are in your field who will care to read these selected papers through. Certainly not enough to keep any technical publication running, especially if the interested readers largely peruse it in the university or public library!

There is, however, it seems to me, a simple way out of the dilemma. It is this: let the authors of research papers offer to the scientific journals, an adequate statement of anything new that their researches have discovered, in the meantime sending their more circumstantial papers to some depository where they may be consulted. Should a worker at a distance wish to see the entire paper, there are various inexpensive means by which copies of it can be made. The great trouble is, at present, that publications are filled with details that only the very few read, although the cost is as great as if everybody read them.

Moreover, the omission of all the harrowing details will serve to brighten up the technical journals, add to the subscription lists, decrease the cost of publication and interest an ever-widening circle of readers in all sorts of research problems.

WILLARD N. CLUTE,
Editor of the *American Botanist*

## INTESTINAL PROTOZOA AND CECAL MATERIAL IN RATS

HEGNER[1] has recently reported that chicks normally evacuate the contents of the cecum, and that this material may be distinguished from intestinal material. The latter is "usually compact and dark in color, whereas the cecal contents are more liquid and yellowish in color." He reports that intestinal protozoa are almost entirely localized in the cecum, and accordingly diagnostic samples may be obtained by the mere selection of the fecal matter. Something of the same nature appears to be true of the albino rat. The feces of the rat are usually hard and black in color, or a dark brown which becomes black shortly after voiding. If the animal is disturbed, however, by unusual handling, shaking or rapping the metal cage, or, best of all, by merely holding it by the tip of the tail while it struggles to escape, a series of defecations usually results, of which the last are soft and yellowish. And, as Hegner reports for the chick, in the rat these soft and yellowish masses are richer in cecal protozoa than the normally passed feces. Presumably the excitement accelerates the movement of the contents through the lower part of the intestine.

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## FORBESICHTHYS FOR FORBESELLA

IN the thirteenth edition of Jordan's "Manual of Vertebrates," the new generic name *Forbesella* Jordan and Evermann is proposed for transitional species of Cave-fishes "connecting *Chologaster* with *Typhlichthys*"—*Chologaster papillifer* Forbes type.

We are informed by Mr. Gilbert P. Whitley that *Forbesella* is preoccupied. The name *Forbesichthys* Jordan and Evermann will replace *Forbesella*.

DAVID STARR JORDAN

# SPECIAL CORRESPONDENCE

## GEOLOGICAL MAP OF NEW MEXICO

A TWO-SHEET geological map of New Mexico, prepared by N. H. Darton on the basis of work chiefly done by many other observers and edited by G. W. Stose, has lately been published by the U. S. Geological Survey on a scale of 1:500,000 in twenty-two formation colors and with 100 meter contours. It is therefore a valuable supplement to the one-sheet map of Arizona published on the same scale and in thirty-two colors four years earlier (1924) by the national survey in cooperation with the Arizona Bureau of Mines. Explanatory bulletins to accompany the maps have been prepared by Darton.

A recent automobile trip across long stretches of both these states from Tucson to Albuquerque and return, with the maps in hand, has enabled me to appreciate their great value not only in setting forth in a general way all that has been thus far learned of Arizonan and New Mexican areal geology, but also in providing a basis for further local work on a more detailed scale. A few of the more striking features shown on the New Mexico map may be here noted. The south central part of the state is traversed by the San Andres range in a gently flexed meridional course seventy-five miles in length, between the broad alluvial plain of Tularosa "Valley," famous for its White Sands, on the east, and the but little narrower alluvial plain of the Jornada del Muerto on the west. The range is a monocline, with a belt of fundamental crystalline rocks along its eastern base, overlaid by a west-dipping series of Paleozoic strata. It is continued northward by the shorter Oscura Range, an east-dipping monocline thirty miles in length, a little offset to the east, the two ranges being separated by a broken-down anticline which trends obliquely to the north-northwest; hence the crystalline complex lies along the western base of the Oscura Range and the Paleozoic strata there slant down to the east. The oblique course of the broken anticline between the

[1] SCIENCE, 69: 432–434.

two ranges thus exemplifies a characteristic of the class of fault-block mountains to which these ranges seem to belong and for which Gilbert long ago found a type example in Nevada. Taken together the two ranges would seem to offer, except for their arid surroundings, a fine subject—especially around their intermediate anticlinal area—for field study by a group of ambitious young geologists, among whom topography, stratigraphy, petrology, paleontology and physiography might be shared.

An altogether different problem is presented by the great Tertiary volcanic area in the midwestern part of the state and its vast extension into the adjacent part of Arizona. The earlier cones are now greatly dissected and degraded; and the earlier lava flows, which at the time of their outpouring must have sought the lowest ground they could reach, are now frequently isolated in cliff-rimmed mesas 500 or 1,000 feet above the surrounding worn-down lower land. On the other hand, the youngest flows, following modern valleys or spreading over low flats, seem to be but few centuries old, so little weathering have their black, rugged surfaces experienced. This indicates that the time interval between the first eruption and the last is long compared to the time since the last eruption, and thus suggests that still other eruptions may take place in the near geological future.

The relation of this great volcanic field to the pre-volcanic topography of its region is interesting. In a number of the high-standing mesas, the capping lava sheets are seen to lie unconformably on the evenly beveled surface of gently inclined strata, thus showing that the land surface of their time had been broadly degraded to low relief, as has been explained by Robinson,[1] and that it must therefore have then stood at a decidedly lower altitude than to-day. The earlier eruptions appear to have obstructed the drainage of the broad lowland, for deposits of unconsolidated sands and gravels are frequently found between the worn-down land surface and the later lava flows. Subsequently the still later cones and flows extended so far as completely to obliterate the preexistent drainage over some thousands of square miles; hence its place has been taken by new drainage systems consequent upon the slopes of the volcanic surface. It is by the headwaters of these new systems that the intervolcanic basins, which abound in New Mexico, have been smoothly aggraded with volcanic detritus during the later periods of eruptive activity and since its cessation. The treeless basin plains vary from five or ten to nearly one hundred miles across. Some of them are drained eastward to the Rio Grande, and those which are nearest to that river are now fairly well dissected. Others are drained northward by head branches of the Little Colorado, but most of the basins are given southward outlets by the headwaters of the Gila.

The deep dissection of parts of the volcanic area by some of the last-named streams has been made possible by a regional uplift whereby the former lowland of degradation, which may, as it stood far inland, have had an altitude of 2,000 or 3,000 feet, has been raised to altitudes of 6,000 or 7,000 feet, while the dissected cones of the volcanic cover now rise in places to altitudes of 9,000 or 10,000 feet. The present position of the continental divide hereabouts appears to have been defined by this upheaval in combination with the accidental distribution of the heavy volcanic masses on the former lowland. Similarly, the group of much-worn cones known as the White Mountains in eastern Arizona and their extension into New Mexico appear to have cut off the former southern heads of the Little Colorado and handed them over to the Gila system; and it is a part of the drainage area thus gained by the latter river that now supplies the reservoir of the famous Roosevelt dam, upon which the irrigation of the magnificent Phoenix oasis depends. Indeed, the White Mountains not only divert the drainage of a considerable area to this admirable purpose, but by their considerable altitude they provoke an increase of rainfall for the streams to carry off through their deep canyons, and furthermore by reason of their altitude the mountains catch a good share of rainfall which, if it fell toward lower ground, would evaporate in the thirsty air during its fall.

It is to the north of the west-central volcanic area of New Mexico that one comes upon the unsymmetrical dome of the Zuni Mountains and, a little farther to the east, the grand volcanic tableland around the dissected cone of Mt. Taylor. Taken together, these two unlike areas include a long and varied sequence of geological formations, from the fundamental crystalline complex in the unroofed center of the dome to the beveled Cretaceous strata under the Mt. Taylor lava flows. Although both areas were described in a general way years ago by Gilbert and Dutton and later in more detail by others, they merit closer study than has yet been given to them; hence here again is a district in which a party of advanced students of geology might find glorious opportunity for investigation—a district more conveniently situated than the arid San Andres range, as it has forests on the higher slopes, contains many ranches and towns and is traversed along its valleys by a railway and a highway. The Zuni dome very naturally defines, in its area, the

[1] H. H. Robinson, "The Tertiary Peneplain in Arizona and New Mexico," *Amer. Journ. Sci.*, 24: 109–129. 1907.

general location of the continental divide, one of the most interesting points of which lies to the north of the dome center between the heads of two competing streams on the wide floor of a subsequent valley that they have excavated along a belt of weak shales. To the south the underlying and stripped Shinarump and Permian strata rise toward the dome center; to the north the Wingate and higher strata stand up in three-story cliffs; the first brick-red member always excites the wonder of transcontinental travelers by rail or highway as they pass near its successive salients.

Each of the two bulletins above referred to[2] contains, first, a section on systematic geology in which the successive members of the geological column are concisely described; and second, accounts of the structure of selected areas. The bulletin on New Mexico, from the overlong title of which the first part should have been omitted, is a compendious handbook, exceptionally well illustrated and indexed. It must become, like the map, an indispensable companion for all geologists who enter the state.

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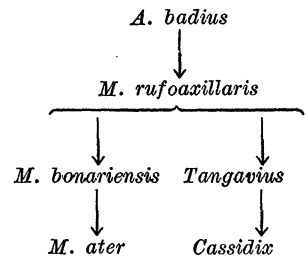
# SCIENTIFIC BOOKS

*The Cowbirds, A Study in the Biology of Social Parasitism.* By HERBERT FRIEDMANN. Charles C. Thomas, 1929. 421 pp., 29 pls., 13 text-figs.

ALTHOUGH this book contains the results of only a portion of Dr. Friedmann's researches on parasitic birds, it probably represents the most important contribution to ornithology within recent years. It is, moreover, of no little interest to the parasitologist and entomologist. The parasitic behavior which consists in ovipositing in the nests of alien species and leaving them to rear the resulting young has been observed in members of no less than five natural families of birds: the cuckoos (Cuculidae), cowbirds (Icteridae), weaver-birds (Ploceidae), honey-guides (Indicatoridae) and ducks (Anatidae). The present work, which is confined to a detailed field-study of the cowbirds, with an account of their geographical distribution, taxonomy and ontogeny and an extensive citation of the pertinent literature, is an admirable demonstration of the kind of ethological investigation that has to be accomplished before the physiologist or experimentalist can even approach the fundamental problems of parasitism.

The cowbirds are a rather compact group of American Icterids comprising three genera: Agelaioides, with two species and three subspecies; Molothrus, with three species and ten subspecies, and Tangavius, with two species and three subspecies. One species of Agelaioides and one of Tangavius are known only from a few museum specimens. The greater part of the volume consists of an account of *A. badius, M. rufoaxillaris,* and *M. bonariensis* which Dr. Friedmann was able to observe in Argentina, of *M. ater,* which he studied very thoroughly in the United States, and of *T. aeneus,* which he observed in southern Texas. There is one other Icterid parasite, the neotropical rice grackle, *Cassidix oryzivora,* to which a short appendix is devoted. The study of geographical distribution, habits (especially courtship and song) and the ontogenic development of coloration all indicate that the phylogenetic relationships of the parasitic Icterids conform to the following scheme:




The baywinged cowbird, *A. badius,* which occurs in Argentina, Uruguay, Paraguay, Bolivia and southern Brazil, is the most primitive form of the series and is non-parasitic, except to the extent that it appropriates, either peacefully or by force, the nests of other birds, particularly those of wood-hewers, spinetails and oven-birds (Anumbius, Synallaxis and Furnarius). It may still exhibit the nest-building instinct, especially early in the breeding season, and usually adds to or rearranges the materials of the nests of which it takes possession. Its breeding instincts are still intact. Dr. Friedmann regards it as the direct ancestor of the screaming cowbird, *M. rufoaxillaris,* the parasitic habits of which were first studied by W. H. Hudson. This bird has the same range as *badius* and lays its eggs almost exclusively in the appropriated nests of its putative ancestor. The shiny cowbird, *M. bonariensis,* with its eight geographical races, or subspecies, ranges over nearly the whole of the South American continent and has become a general parasite on a large number of birds. Its eggs have been found in the nests of ninety-eight different species, eighty-four of them being parasitized by the typical subspecies *bonariensis* alone. Hudson and Friedmann observed occasional abortive attempts at nidification in the shiny cowbird. It pecks holes in the eggs of its host. Its own eggs show great

[2] N. H. Darton, "A Résumé of Arizona Geology," Bull. 110, College of Mines, University of Arizona, 1925; and by the same author, "Red Beds and Associated Formations in New Mexico, with an Outline of the Geology of the State," Bull. 794, U. S. Geol. Surv., 1928.